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WHITE PAPER

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Enterprise and Government Tablet Solutions: Realizing the Gift of Time

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VDC Research
Insights for the Connected World

Executive Summary

In today's increasingly service driven economy, an organization's greatest asset – and cost – is in its workforce and their time. Optimizing this time is at the heart of an organization's operational strategy. With an ever growing share of the workforce mobile – VDC estimates that mobile workers, one billion large in 2013, is the fastest growing segment of the workforce – mobile solutions that connect these workers to one another and with the customers they are supporting can substantially enhance their workflows. The value of these mobile solutions is in their gift of time – both from a workforce productivity and multiplier perspective and also in their ability to provide workers the time to drive more engaging customer interactions.

Central to the reality of today's extended enterprise is the abundance of increasingly capable and functional mobile devices, the ubiquity of wireless networks and access services and the growing crop of immersive mobile enterprise applications. Although the variety of mobile form factors is only expanding and there is no single form factor that will meet every field worker's needs, it is clear that the tablet form factor and its elegant balance of portability and productivity is evolving into a highly capable and impactful field mobile solution. Today's tablets have addressed many mobile limitations while redefining the expectations of mobile computing: extreme portability, instant on, application plurality, rich and intuitive interfaces and highly connected mobile devices.

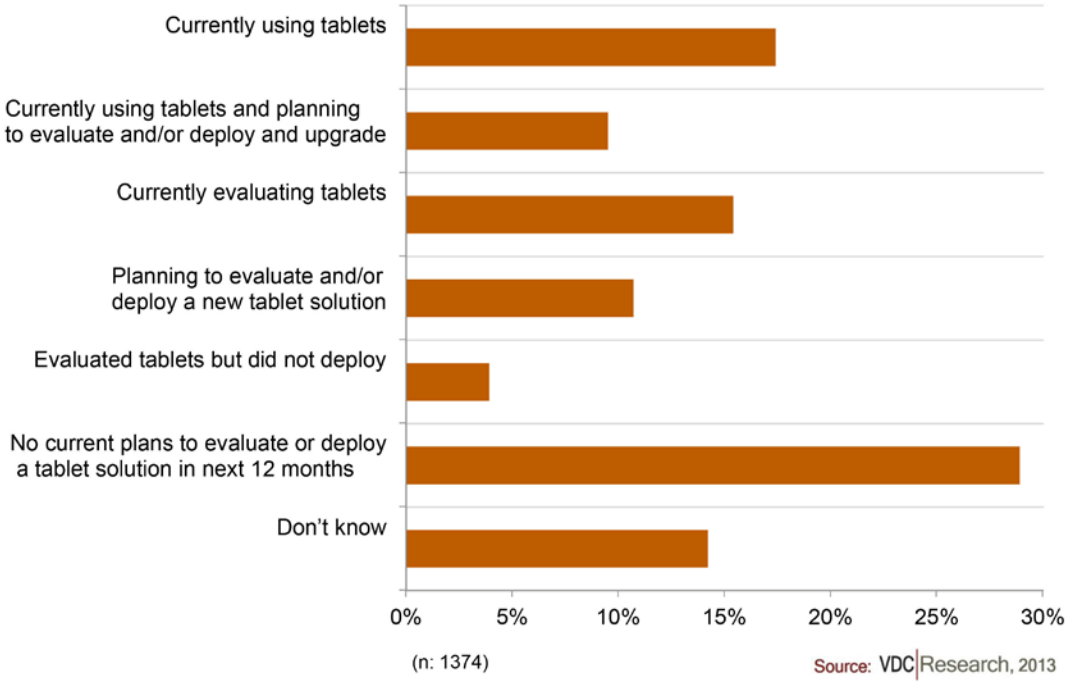
Enterprise and government organizations are validating tablet solutions with over 80% of FORTUNE 500 organizations currently deploying or testing tablets for their mobile workers. However, in today's consumer influenced mobile IT landscape, what defines a strong enterprise tablet? Moreover, how might enterprise needs vary by mobile worker function, especially when considering the unique requirements among frontline mobile workers supporting mission and business critical applications such as field service? From exposure to inclement environmental conditions, to specialized I/O requirements and strict security support, how are these needs being met? Furthermore, which mobile OS is most suitable for enterprise mobile applications where reliability, application sustainability and security are paramount? The fact is there is not a "one size fits all" tablet solution and decisions should focus on identifying the solution that provides seamless time to value while balancing upfront costs with ongoing cost of ownership and support.

Tablets: Evolving the PC Form Factor

Although announcing the demise of the 'traditional' PC is clearly premature, change is afoot with the limelight focused squarely on the tablet. While initially perceived primarily as 'content consumption' devices, tablet use cases are extending well beyond early expectations. This is especially evident for field workers across a variety of industries as diverse as utilities and energy, manufacturing, retail services and healthcare. While tablets are not new to the enterprise and have been used successfully across various workflows, early solutions had several shortcomings that limited their broader appeal.

However, today's tablets have redefined this powerful form factor. Leveraging the more intuitive multi-touch interfaces made popular with today's smartphones and the continuously improving processing architectures, the tablet form factor has evolved substantially and continues to do so. With significant R&D investment directed towards this form factor, the use cases for these solutions are expanding. Over the next three years, we are expected to experience an explosion in tablet adoption, with shipments reaching almost 400 million tablets by 2016. Of those tablets, approximately 39% is either going to be directly issued by enterprise organizations or supported through a BYOD program.

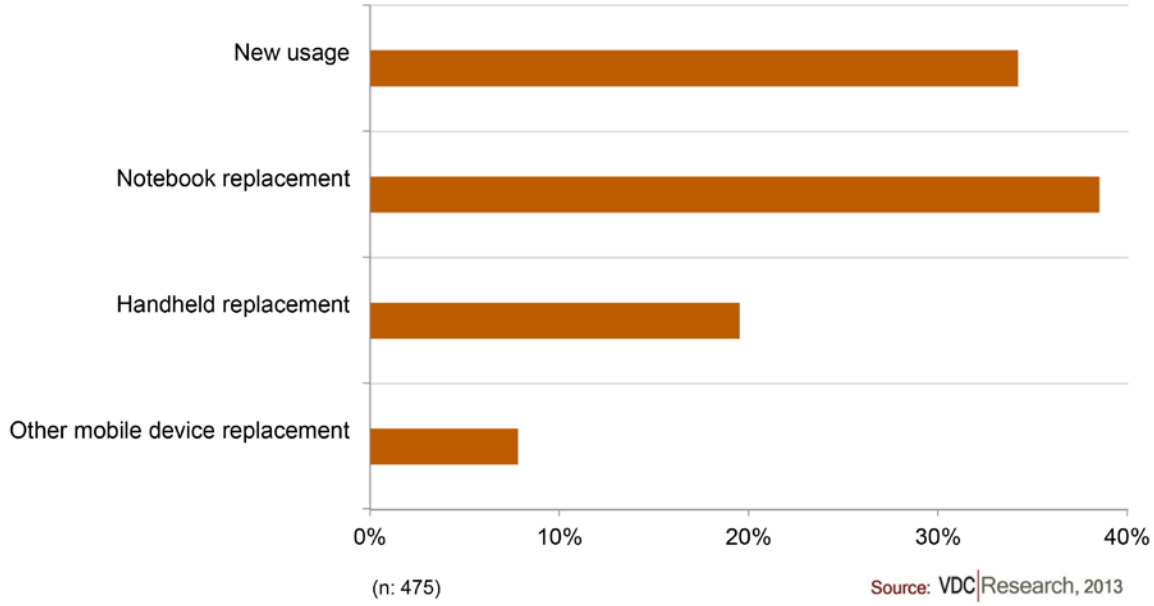
Exhibit 1: Tablet Investment Situation



One of the most telling statistics signifying the rise of tablets as a computing platform – and not just a content consuming device – is the rate at which tablets are being evaluated and deployed as a displacement device. According to research conducted by VDC Research among enterprise IT decision makers evaluating solutions for frontline mobile workers, of the organizations that either deployed or planned to deploy tablets to their workforce, 31% were looking at these mobile devices as a notebook replacement and 20% as a handheld replacement

Equally, if not more important is the fact that for organizations with mobile frontline workers, the tablet is being evaluated to support and mobilize entirely new workflows that had previously been supported with manual processes. The use of tablets for mobile inspection applications or to support field sales and merchandizing solutions is improving not only productivity but also the quality of service provided by these mobile workers. In fact, for many organizations deploying tablets is the catalyst for a broader initiative to review and adjust existing workflows to identify opportunities to streamline and improve processes.

Exhibit2: For your frontline mobile workers, was/is the tablet considered as a notebook or handheld replacement or is it supporting new workflows and use cases?



Defining the Enterprise Tablet

Akin to PCs in the 1980/90's, the Internet in the late 1990's and WiFi in the early 2000's, the introduction of many tablets into today's enterprise environments is through the individual employee. In response to this wave of employee owned tablets and smartphones entering the enterprise through the back door, we are witnessing a flurry of MDM (mobile device management) panic installations with limited foresight into the strategic value of mobility.

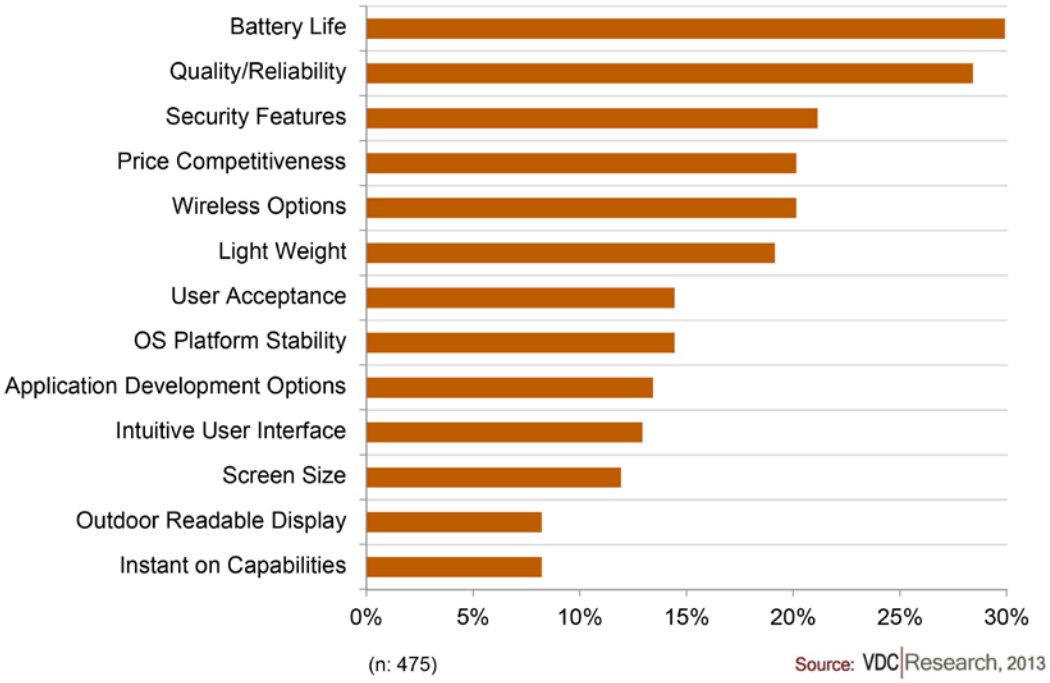
Nevertheless, consumer mobile devices are setting the new benchmark of what any mobile device should look and feel like and are motivating a new breed of enterprise tablets. However, in today's age of IT consumerization, is it even possible or realistic to distinguish between 'consumer' and 'enterprise' devices? A necessary, yet often overlooked, distinction about consumerization of IT is that ultimately its impact on mobile solutions for field workers will be more about introducing "consumer" UI and UX on enterprise devices rather than using consumer devices for enterprise mobile workflows.

So what characterizes a good enterprise tablet for frontline field workers? This fundamentally comes down to a function of target user and application. For the enterprise end user the tablet is much more than a "cool" entertainment platform. For many it is an essential tool required to support their workflows. Put another way, the ability for these workers to do their jobs effectively is severely diminished if their tablet solution does not operate seamlessly. Therefore capabilities such as tablet reliability and stability, robust security and device management and strong lifecycle support are as important as many of the technical features. Furthermore, many mobile enterprise workers are using tablets in harsh environmental conditions that their tablets need to be able to withstand. From extreme temperatures, to use with gloved hands or in wet conditions to high altitude exposure, these all represent daily conditions of many mobile workers. Ensuring that all of these factors – from technical to environmental and support – are taken into consideration are essential when evaluating and selecting tablets for enterprise use. .

Aligning Field Mobile Applications with Target Tablet Solutions

The largest determinant for making appropriate investment decisions are mapping tablet capabilities and specifications to the application requirements and potential hazards in the deployment environment. Understanding and addressing the key challenges that limited adoption of first generation tablets in the enterprise – from user interface, price, battery life and overall ergonomics – is similarly important. In addition, a critical element for any successful field mobility solution is to analyze the business elements. These include length of deployment/replacement cycles, failure rates and causes, opportunity cost of lost productivity, to name a few. Through such a full analysis, organizations can determine the solution which will best serve the company.

Exhibit3: Top Three Tablet Requirements



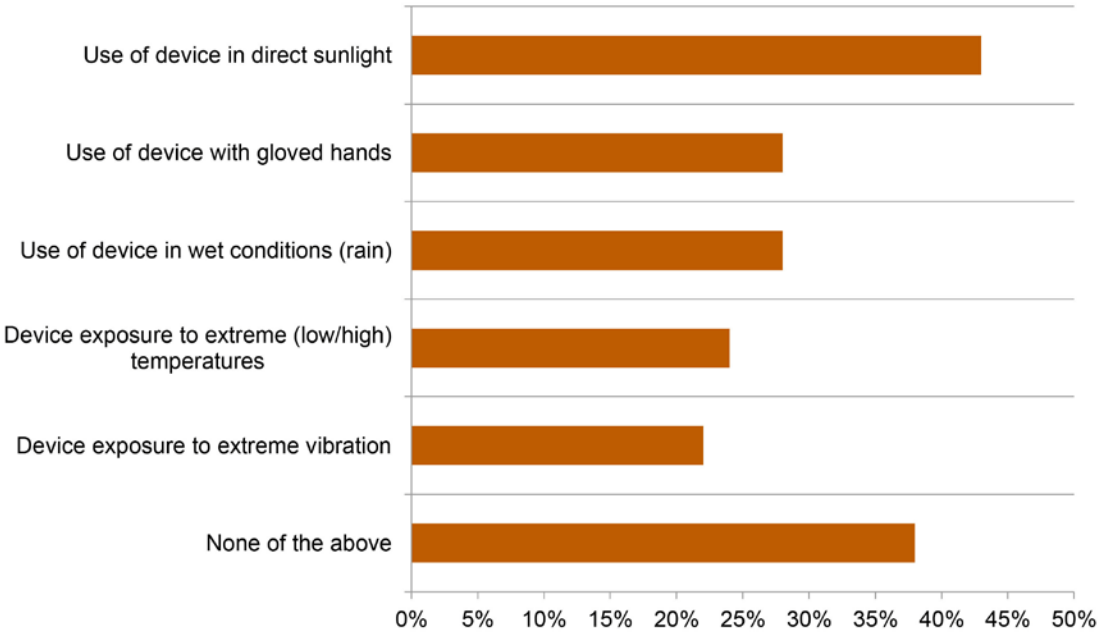
Tablet requirements for enterprise customers and consumers are measurably different, especially when it comes to security, management, reliability and uptime, IT integration, ability to audit and support. Some of the more critical include:

- **Battery Life and Management**. A major requirement for field mobile solutions is a strong all-shift battery performance without significant design implications. The desired target is between 8-10 continuous hours of operation. According to VDC's research, 65% of enterprise tablet users today indicate that their batteries 'frequently' or 'occasionally' do not last the full shift. Tablets designed for enterprise use – including rugged devices – fared better than consumer devices in battery performance. Moreover, the ability to replace batteries in the field – including hot swappable batteries – is a critical feature for field applications.
- **Security**. A critical requirement for any field mobile solutions, it becomes only more important with the adoption of increasingly sophisticated customer facing and engaging tablet applications. Today, enterprises are mixed in their impression of mobile security with only 50% stating that their organization has instilled effective mobile security policies to address the potential risks mobile devices pose to corporate networks.
- **Durability and reliability**. Based on their design and portable use cases, the risks of damaging a tablet are great, increasing the premium for durability. Annual failure rates of consumer tablets supporting field mobile applications was recently measured by VDC Research at 19%, substantially higher than the 4.5% of rugged enterprise tablet. Consequences of mobile device failure, especially for highly optimized field mobile applications, include a significant disruption to workflows, lost productivity, the potential for customer service erosion and employee fatigue.
- **Wireless options**. Integrated VPN, WAN and WiFi radio management are all baseline requirements for all field mobile application development and hardware. In addition, with many field workers operating in highly remote settings and often without access to wireless networks, store and forward capabilities remain a critical requirement.
- **Ease of use and support**. Leveraging consumer design styles to deliver greater ease of use and user experience is critical when considering next generation enterprise tablets. However, beyond ease of use, ease of support is of equal importance. Key support requirements include mobile device and application management, help desk services, depot and advanced maintenance and repair services.
- **Input/output flexibility**. While few consumers have the need for serial ports today, that is not the case for several field mobile applications. For example, in the telecommunications sector, the need for the service technician to interface with assets via a serial port remains a key requirement. Providing I/O design flexibility that addresses unique interface requirements represents a significant value add that often cannot be supported by consumer devices.

Know Your Field Worker's Environment

For field mobile workers especially, the need for stable and reliable solutions that are designed with their needs in mind is critical. Assuming their requirements are similar or equal to those of other mobile workers and can be satisfied with a "standardized" solution is a critical misconception that leads to the misapplication of technology. Therefore, one of the most important aspects when considering field mobile solutions is the environment within which these devices will be used.

Exhibit 4: Environments or Scenarios Most Common to Frontline Mobile Workers



According to a recent survey fielded by VDC Research among organizations supporting field mobile line of business solutions, the environmental considerations are diverse and span extreme temperature exposure, use of device with gloved hands or in wet conditions and use of device in direct sunlight. Consider the following:

- **Temperature Exposure**. Most consumer mobile devices have an operating temperature range of 32ºF to 95ºF/0ºC to 35ºC (and a non-operating range of -4ºF to 113ºF/-20ºC to 45ºC). Exceeding these temperature ranges will cause a device to shut down or in the worst case cause substantial damage. For many field mobile workers, especially those working in hotter climates, the temperature in a vehicle when parked can quickly exceed those ranges, effectively making these devices inoperable and creating significant disruption to workflows.
- **Direct Sunlight Exposure**. This is one of the most common issues for field mobile workers. Many field mobile workers need to use their mobile devices in direct sunlight or ambient light conditions. Most consumer devices are ill equipped to support this as their capacitive touch displays are easily washed out. Although consumer devices are operable in these conditions, the user experience is substantially compromised.
- **Use of Device in Wet Conditions and with Gloved Hands**. Interfacing with the touch display with gloved hands or in wet or humid conditions is uneven at best with many consumer devices. According to VDC's research, these are requirements for approximately one in three organizations supporting field mobile applications.

The success of many field mobile workers is closely tied to operational metrics such as 'volume of jobs completed' and 'workforce utilization' and increasingly, more customer centric metrics such as 'SLA compliance' or 'customer satisfaction and retention'. Disruption of field mobile processes can and does have significant consequences with poorly performing field mobile workers frequently described as an organization's weakest link.

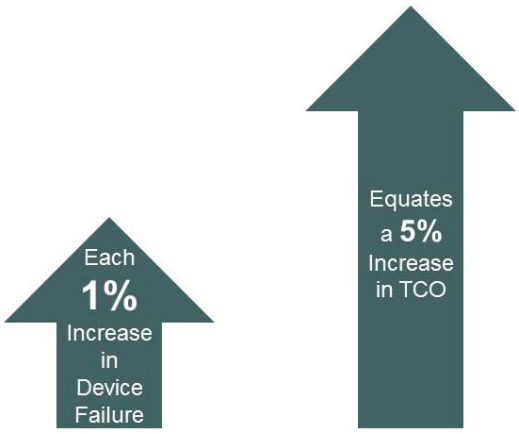
With growing expectations and demands for field mobile performance to achieve their 'full potential', mobile technologies are increasingly integrated into workflows. VDC's research evidences workforce productivity benefits in excess of 40% of and customer satisfaction and loyalty improvements averaging 30% as a result of the adoption of well-designed mobile solutions.

However, failure of tablets in the field can have the opposite effect. According to VDC, the consequence of failure of tablets can result in an average loss of productivity of 128 minutes. This translates into not only to significant increases to solution cost of ownership but can similarly erode customer satisfaction and loyalty.

Sustainable Development and the Hidden Costs of Tablet Solutions

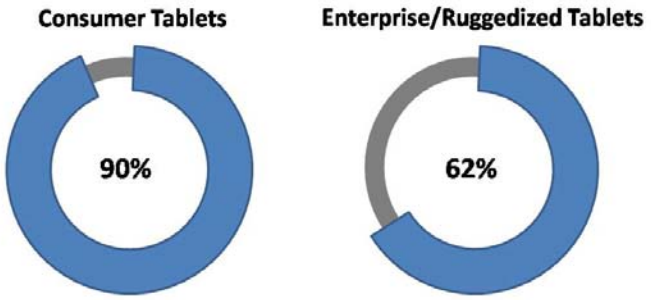
Enterprise mobility solutions can represent substantial investment for organizations. Especially in today's budget constrained environment, the focus on cost containment is heightened as organizations look to limit their investment exposure. For tablet investments, this often comes down to the decision of which tablet to adopt. The low adoption cost of consumer tablets and the "I can purchase four of these for the price of one of those" argument frequently trump the investment decision making. However, this represents short-sighted decision making and can result in significant post deployment cost implications.

Exhibit 5: Correlation Between Device Failure and TCO



For frontline mobile applications, the premium for reliability cannot be understated. Each percentage point increase in tablet failure can result in a five percent increase in cost of ownership. The disruption to the workflow, support costs and redeployment costs and a few of the overlooked 'hidden' adoption costs. Furthermore, the lifecycles of consumer devices are often in conflict with enterprise requirements. Deploying solutions that have sustainable lifecycles and support frameworks aligned with enterprise requirements are equally critical investment requirements.

Exhibit 6: Productivity Loss and IT Support Costs as a Percent of TCO



Consumer Mobile Device Challenges Extend Beyond Failure Rates

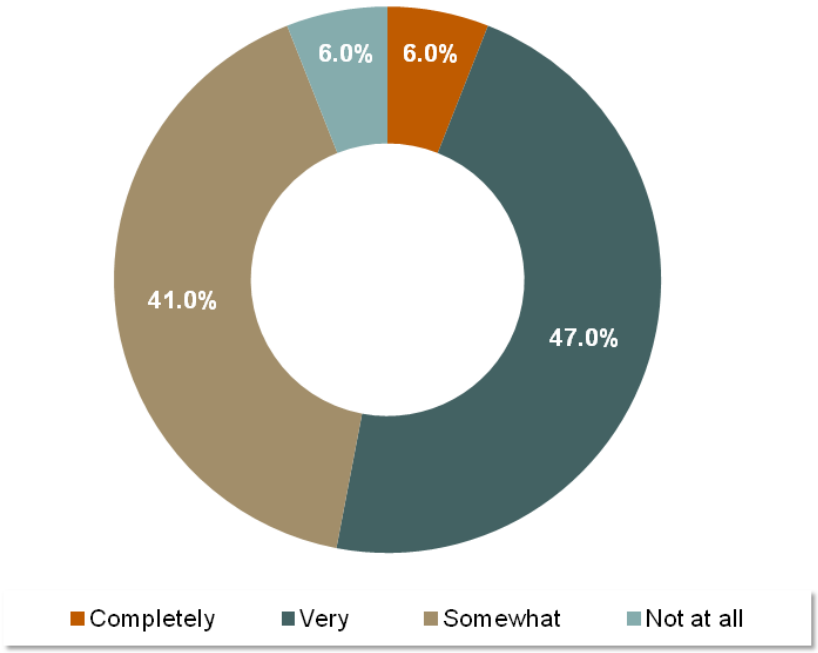
The recent advances we have witnessed to mobile technologies have been staggering. Many of these were innovations first made available on consumer devices. As a result, the desire to leverage these sophisticated new consumer devices in the enterprise across a variety of use cases is very real. Moreover, trends like BYOD have radically changed how mobile devices enter the enterprise and how they are supported. However, in scenarios where the mobile device is central to supporting the enterprise workflow – such as among field service workers in manufacturing or delivery personnel in wholesale distribution and logistics – the need for a more traditional or centralized approach to mobile technology deployment that address both the needs of the ultimate end user AND the IT support organization is critical. IT organizations must approve and manage the mobile devices and applications in these scenarios and use cases. Not doing so will severely limit the ROI potential of the solution.

With an ever expanding mobile workforce, enterprises are keen on benefitting from mobility solutions across their organization. This includes deploying consumer devices to critical line of business mobile workers with a combination of I/O and support accessories. However, it is among this segment of the workforce that we are witnessing the greatest challenges for these devices. Included among the challenges are:

- **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.
- **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.
- **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.

- **Robust security solutions.** The need for security to support enterprise and government mobility solutions is clear. However, for many frontline mobile workers accessing sensitive information, the requirements are even more acute. From two-factor authentication requirements in Public Safety to access Criminal Justice Information Services (CJIS) reporting to Health Insurance Portability and Accountability Act (HIPAA) encryption requirements in Healthcare the needs are acute. Today only one in two enterprises states they are 'completely' or 'very' confident in their mobile security policies.

Exhibit 7: Confidence in enterprise mobile security policies



- **Enterprise accessory lifecycle management**. For many enterprise applications, accessories represent a major contribution to overall solution investment. From vehicle mounts and port replicators to mobile printers and data capture solutions, the use of accessories to create a more complete solution is critical. Ensuring forward migratability and compatibility of this infrastructure represents a significant value add to enterprise organizations, especially those evaluating migrating from notebooks to tablets.
- **The need for enterprise grade data capture.** For many field 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.
- **Mobile OS mix and potential for fragmentation more acute with consumer devices.** Windows has been the dominant platform for ruggedized devices. Conversely, on consumer devices, operating systems with modern and intuitive interfaces are pervasive. The clear trend in the market is towards a multi-OS environment, especially for mobile devices. However, enterprises are risk averse and are looking to mitigate OS platform risk wherever possible. This means sustainability and lifecycle support when it comes to application development and design, seamless back-office integration capabilities and the use of non-proprietary open tools in a highly scalable and reliable framework.
- **Support for unique enterprise functionality for specialized workflows.** From Digital Exchange (DEX) requirements in Direct Store Delivery (DSD) to serial port interfaces in asset management applications, I/O configurations for many enterprise applications can be far from common. One of the strong benefits of specialized enterprise mobile devices is in their design flexibility to support unique interface requirements.

Total Cost of Development: Key Considerations When Developing Line of Business Applications

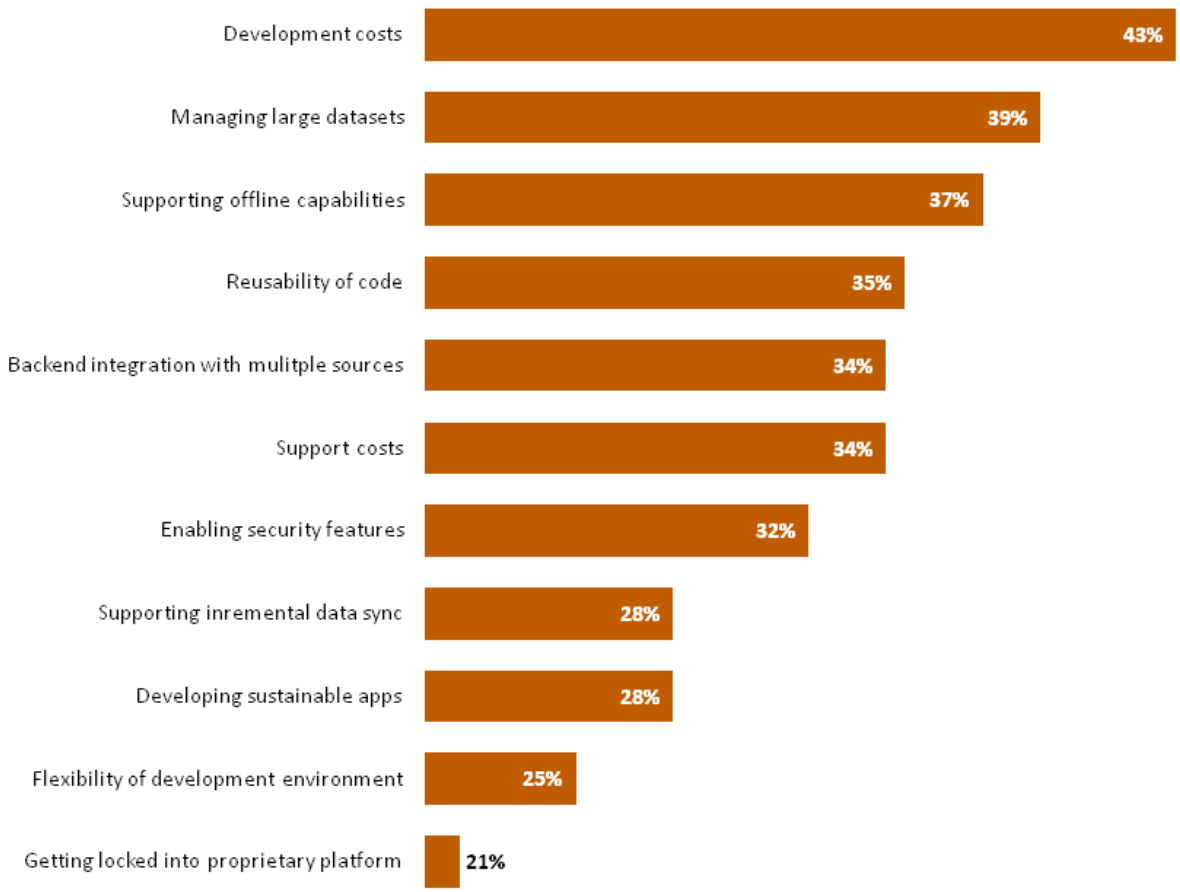
The myriad of options available to enterprise decision makers looking to mobilize B2B, B2E or B2C workflows and experiences is challenging and introduces significant complexity to the equation. Moreover, developing mobile applications for the enterprise is vastly more challenging than consumer app development in that issues such as off line support and synchronization, uncompromising seamless backend integration and the ability to support large datasets are all critical requirements.

Adding to these complexities are the economic realities of enterprise mobility ROI, cost of development, and time to market pressures. Enterprise mobile software development challenges are extensive. Moreover, these challenges are not unique to a particular type or size of organization, but can be traced industry-wide. From development economics and platform fragmentation, to access to capable mobile software developers, enterprises are keen for solutions that enable more efficient and agile development.

Windows in the Enterprise: Support and Management Consistency

The use of Windows solutions for frontline mobile applications across a variety of industries – from Public Safety and Utilities to Healthcare and Transportation – is widespread and represents the legacy platform for many significant applications. Although many organizations evaluating tablets for new or manual workflows are also considering alternative mobile platforms such as iOS or Android, these legacy Windows users remain highly committed to their platforms. The capabilities ranging from platform stability and security, management infrastructure and continued support for existing applications are all factors leading to continued investment in Windows for many frontline mobile solutions.

Exhibit 8: Mobile Development Challenges



The key value proposition for the Windows OS for enterprise mobility solution includes:

- **Backend Integration.** Supporting backend integration with capabilities such as identity management, offline storage, managing large datasets, integration with enterprise systems, messaging and others clearly represents a major requirement for many enterprise and government mobility applications. However, today, the biggest challenge for enterprise mobile applications is backend integration. With Windows a dominant backend platform, the value provided by Windows-powered mobile end points is clear. This was supported by mobile developers who indicted that Windows trumped other mobile platforms when it came to backend integration.
- **Application sustainability and lifecycle management**. Mobile enterprise applications are often developed without clear foresight and lacking alignment with existing IT business processes to design, build, test and maintain apps. For example, mobile application testing can be a substantially complex undertaking as subtle changes such as switching from one carrier network to another may have a profound impact on how a device operates.
- **Offline support**. According to our research, 89% of developers identified offline support as a critical requirement for the mobile enterprise applications they are developing. A synchronization strategy that incorporates incremental synchronization absolutely needs to be part of any enterprise mobile development initiative, especially for line of business mobile applications. Developers identified "supporting offline capabilities" as the third most critical backend development challenge. Critical is planning for robustness against limited connectivity and low bandwidth scenarios.
- **Cost of development.** Line of business mobile applications represents sophisticated and time intensive development efforts. According to recent research conducted by VDC Research, development of line of business mobile applications native to Windows is less time intensive than alternative mobile platforms such as iOS and Android when considering the entire development process including back integration and support requirements. In fact, developers contend that Windows development offers up to a 20% time savings when compared to other platforms.

Android in the Enterprise: Modern Mobile Application Development

One reality of today's mobile enterprise is that the days of a single dominant platform are behind us. With the growing scale of BYOD in the enterprise, organizations are evolving to support multiple mobile platforms including iOS, Android, Windows and BlackBerry. For field mobile workers, the value of BYOD, especially considering their unique requirements, is questionable. However, when it comes to application design and end user requirements, the influence is clear. Due to the valuable and often sensitive nature of the content residing on mobile devices and their broad attack surfaces, CIOs and IT personnel are challenged with protecting these new end points from the vulnerabilities and threats that they are regularly exposed to. Given the rapidity in which mobile deployments are expanding in enterprise settings, securing mobile devices and applications has become a top priority.

The key value of tablets lies in the applications they enable. Consequently, demand for more modern and intuitive user interfaces for field mobile applications is driving the opportunity for alternative platforms. While Android has become the dominant smartphone platform and is rapidly evolving as a tablet solution, enterprises have taken a cautious approach to supporting this platform. At the root of the issue has been the fragmentation of the platform across vendors and its perceived security vulnerabilities.

With platform fragmentation and security and malware issues looming large, Android has been perceived as a vulnerable platform for enterprise applications. While many of these issues still remain, Google has made significant strides in addressing enterprise security. In addition, availability to robust third party device and application management and security tools is addressing many of these issues.

Specific enhancements include the release of Android Device Manager which gives users the ability to remotely locate, lock and wipe their missing device, the ability to restrict user profiles which is especially useful for tablets in the enterprise that are shared among several employees, and verified boot capability which helps prevents root kits from holding onto root privileges in compromised devices. In addition the recent release of KitKat (Android 4.4) includes a enterprise-friendly security upgrade that permits IT to use the SELinux mandatory access control (MAC) systems inside the Android sandbox to block attempted intrusions. Combined, these incremental improvements are evolving Android into an enterprise-grade OS, and one that CSOs and CIOs will have little reason to exclude from their "approved" hardware lists.

Conclusions and Recommendations

The cost reduction and revenue growth benefits of tablets in today's enterprise are far reaching and cannot be understated. At the same time, the complexities and challenges of a rapidly evolving enterprise market for tablets are just beginning to emerge. Key tablet investment success requirements include:

- **Let the application and environment drive tablet selection**. Understanding the conditions within which tablets are used is imperative to select the best fitting solution. Issues are far reaching as exposure to sunlight, water, vibration and dust can directly influence the success of the solution.
- **Don't make tablet accessories an after-thought**. Many enterprise tablet solutions are supported by third party accessories such as payment sleds, bar code scanners and others. These add-on devices can represent substantial upfront investments and often can be a key source of failure. Moreover, not properly anticipating accessory lifecycles and replacement/upgrade can adversely impact the success and ROI of a solution.
- **Plan for more training than you expect**. Especially when migrating from alternative mobile solutions or more manual processes, the change(s) experienced using a tablet can be significant for employees.
- **Prepare for the 'hidden costs'**. Understanding what the support requirements will be for tablets – from helpdesk calls to replacement and upgrades of mobile devices – is critical. Establish and track key support metrics. Poorly designed tablet solutions can result in a post deployment cost – including support and downtime – in excess of 80% of total solution TCO. The cost of supporting and managing a device post deployment is just as, if not more important that the upfront device investment.
- **Focus on sustainable tablet application development**. Lifecycle management for not only the mobile device, but also the application and any associated peripherals, including key upgrades, needs to part of a broader mobile strategy. For more sophisticated enterprise mobility applications, the need for stability and reliability is critical.
- **Tablet battery management is a key requirement**. According VDC's research, approximately 60% of enterprises supporting tablets indicated their batteries were not lasting the entire shift "Frequently" or "Occasionally". Better management of batteries, including the ability to replace them in the field and services available to enterprise to better manage and monitor battery performance are all valuable features. .

Balancing enhanced portability and mobile ergonomics with advanced processing power and large displays to run meaningful applications, tablets are clearly evolving into strong and increasingly strategic enterprise mobile computing and communications platform. From sales agents and insurance adjustors to field service technicians and airline pilots, the use cases for tablets in the enterprise is virtually endless and will only grow with today's expanding mobile workforce. Successful tablet solutions for these workers will translate into not only a more productive workforce but ultimately one that has more time to deliver richer customer engagements. Realizing this potential will require a measured approach when selecting the right tablet for these critical workers and workflows.

About the Research

VDC Research was commissioned by Panasonic to conduct research among enterprise mobile IT decision makers and software developers to analyze their deployment and development approach, assess their requirements and compare the capabilities and challenges of various approaches to mobile development and assess the cost of ownership and cost of development of various approaches. To support the research VDC Research fielded a survey that was completed by 186 qualified respondents. The respondents consisted of individuals with direct experience and responsibilities for enterprise mobile solution design and application development either for their organization or their organization's clients.

ABOUT VDC

Market Intelligence for Technology Executives. VDC Research Group (VDC) provides market research and advisory services to the world's top technology executives. Our clients rely on us to provide actionable insights to support their most important strategic decisions. The firm is organized around four practices, each with its own focused area of coverage including: automatic identification and data collection, embedded hardware, embedded software and enterprise mobility.

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