BLUEFLETCH MOBILE REVIEW

№1 2016

INSIGHTS INTO ENTERPRISE MOBILITY SOLUTIONS

LETTER FROM THE FOUNDERS

– Richard Makerson

– Brett Cooper

There is no magic pill or technology for instantly transforming an organization's legacy mobile platform to the next generation modern mobile platforms.

With more than a decade's worth of experience leading enterprise mobile deployments and delivering custom solutions - enterprise mobility is at the core of everything that we do. By sharing our thoughts and expertise, we hope our partners, clients and other organizations will find value in and learn from our shared knowledge.

These articles are based on our past and current experiences leading organizations through legacy mobile platform changes. You will find our client-first approach applied to a large scope of projects, from process efficiencies to next gen device rollouts. We explore how companies can use data and insight from individual devices to transform how they approach enterprise mobility and we share our expertise on omni-channel retail strategies, large scale MDM migrations, the exciting world of IoT and much, much more.

At BlueFletch, we strive to make our clients and partners look like rockstars, we are passionate about solving their toughest problems, and we pride ourselves on delivering mobile solutions that end-users love to use. We hope you enjoy these articles and that they help you drive meaningful conversations within your organization. We welcome your comments and feedback.

Sincerely,

Richard Makerson and Brett Cooper

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We focus on building enterprise mobile tools so you can focus on your business. Leverage our experience delivering custom solutions to jump start your next generation device deployment.

Leverage BlueFletch's client-first approach and suite of product accelerators to leap frog the competition so that your organization can focus on your core business.

Our suite of accelerator products transform the productivity of our warehousing partners.

Learn more on page 14

Our enterprise intelligence platform provides retailers richer data and greater in-store visibility.

See page 34 to learn how

Our experience and client-focused approach guide our clients to successful mobile implementations.

See how on page 42

MIGRATING FROM YOUR LEGACY MDM

By Brett Cooper

“Just install the new MDM and have it delete the old one… how hard can it be?”

Don’t you just love it when your management decries that something should be technically easy while they are unaware of the constraints that surround the technology, infrastructure, and software. During my career I have experienced my fair share of hasty decisions leading to problems I’ve then been asked to solve. This is often exacerbated by a software sales guy who over-promises “it should just work out of the box”… Where is that guy at 2am when you find a bug in their software and have to go through the painful process of backing out your deployment?

Over the last few years, we have helped an increasing number of customers with MDM migrations for their enterprise rugged devices. Most typically going from one of the legacy MDMs (like MSP or Athena) to a newer MDM such as AirWatch. These migrations have ranged from a few hundred devices up to 40,000 devices. As AirWatch has become more popular in the marketplace, it seems that most folks are moving in that direction.

The goals of MDM migration are simple:

The Destination

GOAL NO. 1

"We would like to migrate as quickly as possible with no outages and limited changes to our infrastructure."

Mobile devices (even legacy devices) have become key to the operations of most businesses. Companies can't afford to have a large portion of their mobile fleet out of service for an upgrade. Additionally, they don't want to have to change their network or server infrastructure.

GOAL NO. 2

"We want a no-touch solution where users or technicians don't have to manipulate individual devices to migrate them."

For smaller migrations, you can get away with having end users scan bar codes or sending a technician out to migrate devices, but when you get to 10,000+ devices and hundreds of sites… this gets really expensive really fast.

GOAL NO. 3

"We need our repair / depot process to be seamless as we migrate to the new MDM."

You have to support the devices replacing ones broken in the field. Ideally, you don't want users to have to wait an hour for a new replacement device to pull down and install its software.

The Road Map

There are dozens of other needs we could list, but these are the fundamental requirements that consistently resonate with our clients.

To be successful in migrating your MDM, there are a few key steps you need to perform: Migration Analysis, Migration Package Creation, Testing and Deployment Support. Whether you do these internally, hire someone, or have the MDM vendor complete them, it's important that these steps are executed.

STEP NO. 1

Analysis, Audit and Migration Plan

It's important to understand everything about your current mobile device landscape.

Areas where we start our analysis typically include:

DEVICE USAGE PROFILE – Who uses the devices? When and where do they use them? What are the off-cycle times when you can push a migration package?

Legacy devices ready for migration

INFRASTRUCTURE LIMITATIONS – Do you have any limitations on connectivity, such as bandwidth peak usage times or devices needing specific authentication to get on the network?

EXISTING PACKAGES – Do you understand your current application deployment packages?

SOFTWARE DEPENDENCIES – What are the priorities or dependencies of the install sequence for your current applications?

OWNERS – Who owns individual applications? Who is responsible for regression testing changes before they go to the entity responsible for supporting network? How do you engage the help desk team?

DEPLOYMENT FREEZES – Know when you are and are-not able to make deployment to production systems. For example, retailers typically have freezes around the holidays.

CURRENT DEVICE PROBLEM BASELINE – You need to understand operationally how the devices are performing to know if you introduce any new issues into production.

Following completion of your MDM Migration Analysis, you should have the following deliverables:

MIGRATION PLAN – Your master migration plan should show all of the teams, expected timelines and dependencies.

STAKEHOLDER MAP – Defines who is responsible for what areas of the migration (e.g. packaging, testing, support).

PACKAGE MAPPING – Documentation on all of the packages that will be deployed, specifying devices and locations (including dependencies and sequencing).

SUPPORT PLAN – Defines how you will handle migration issues. Typically you will have some amount of device migration failures and your help desk team must be ready to re-mediate those devices (or have a depot process to swap them).

A migration analysis and the development of a migration plan should take between 1-4 weeks, depending on the size of your device fleet and the variations of devices and software packages. The help desk team must be ready to re-mediate those devices (or have a depot process to swap them).

STEP NO. 2

Migration Process and Tooling

We have observed some teams attempt to lay down AirWatch using their Legacy MDM and then expect the new MDM agent to take over as the primary agent on the device. This approach has major consistency issues. There are too many timing hiccups and potential resource conflicts for this to be a repeatable working process.

For the device software migration process, we recommend a clean cut-over process. A hands free migration approach needs to leverage the static application memory on the device and a device wipe. I see a lot of MDMs recommend that you use barcodes for this, but that requires a physical human to touch every device. We typically recommend avoiding barcode scanning except for devices that need to be remediated.

To develop an automated migration process, you need to perform the following tasks:

Determine what you need to backup before you clean wipe devices – Typically before we wipe a device, will we back up calibration settings, timezone information, network information and device site information.

Determine how to handle bootstrapping devices when they come back up in a clean wiped state – When your device starts up after a clean boot, you need to start the bootstrapping scripts or tools. On Zebra and Honeywell devices there are different ways to handle this, Zebra has StartupCtl and Honeywell/Intermec has auto cab. I suggest your tech teams familiarize themselves with how these tools work.

Determine how to get devices back on the network – When your devices start up, you need to understand how to restore network connectivity. There are different ways to do this on different devices types. Generally on legacy CE devices, you can import specific registry keys to set the device's network connectivity.

Determine installation and enrollment process for AirWatch (or your new MDM) – After your device has network connectivity, you need to install AirWatch and its associates credentials bin file(s) and trigger AirWatch to enroll the device.

Determine how to set organizational groups and smart groups for your devices – Once your device has enrolled in AirWatch, you need to set the organization group. You can do this by using varied enrollment credentials or by creating a custom Organizational Group Bootstrapper (OGB) that leverages AirWatch APIs. Supposedly, future versions of AirWatch will include some OGB functionality out of the box, but for now you have to do this custom if you need to set OGBs based on custom site criteria.

Generally, you can expect to spend 3-7 weeks developing and testing your migration packages and sorting out variances between devices types and configurations.

STEP NO. 3

Pilot and Deployment Support

The last hurdle for your successful migration will be your pilot process and development of migration support procedures. Unfortunately, migration is not as easy as flipping a switch and deploying to all devices. You need to validate your process, identify the failure rates and staff your support team at appropriate levels to deal with any migration issues. The following are the key areas of deployment support to consider:

MIGRATION ROLLBACK – If a device gets stuck in the migration process, you need to be able to send barcodes to site to roll back (or roll forward) the device to the correct state.

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RUN PILOTS AND UPDATE PROCESS – Start your pilot process with a minimal set of devices at a single site. If that is successful, then expand your migration process to all devices at that site. As part of your pilot process, you also need to test rolling back all devices using your failed migration process. Update your process for any issues you encounter and scale to two sites, and then to five and 10 sites.

REPORTING TOOLING – You must be able to accurately report on your pre-migration and post migration devices in each system. This includes a report to show that all of the software has successfully been reinstalled on your devices. In addition, include reporting on the performance of your servers and your site network consumption.

HELP DESK/SUPPORT TEAM COORDINATION – During your rollout you need your help desk and support teams to help with devices that get stuck in migration or do not migrate properly. A general rule of thumb is that at least 5% of your devices will not migrate without user intervention.

DEPLOYMENT SCALE-UP TESTING – After you nail your pilot site deployment, you need to scale up your deployments. I recommend doubling your site counts every night until you get within 80% of the available resources for your server (both legacy and new). In general, I have seen peak deployment happen at around 2000-3000 devices per night, but your mileage may vary depending on the complexity of your packages.

Ideally, you want your migration deployment to happen as quickly as possible, but you have to balance the speed of your deployment with your ability to support migration issues.

At the end of the day, the number of devices and the complexity of your software packages will drive how long it takes to get everything migrated over. If you have a complex mobile landscape and someone tells you that they can get it migrated over in a week, I recommend that you run quickly in the other direction (they are most likely a sales guy). A well planned and executed migration with minimal downtime can take anywhere from 8 to 20 weeks.

In order to be successful make sure that you: develop a practical and workable plan, focus on keeping the process simple (and no-touch) and plan for failure and remediation of a small subset of devices.

BRETT COOPER is the Founding Partner at BlueFletch. He specializes in strategy, infrastructure, project management, security, and enterprise system implementation.

Extend the life of your warehouse management system.

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Let's talk about how we can help.

BlueFletch

A Decade of Experience Yields Designs for the Future, Now

By Alan Lampa

After a decade of working on mobile enterprise one thing has become clear – insight into what's happening on an actual device and a history of the device's behavior, saves time, money and headaches

With over a decade of experience in enterprise mobility, we know what it takes to perform a successful deployment; whether it's rolling out new applications, installing devices or migrating from legacy WinCE devices. We've worked with most devices, OSs, MDMs and application analytics software out there and we've learned a thing or two along the way. In the process, we've come to know the pains of performing such deployments. We used this hands-on experience and knowledge gained to shape the direction for Optiko, our solution for resolving typical issues in enterprise mobility.

How We Know What We Know

Back in the early 2000s when BlueFletch was just a twinkle in the founding partners' eye, we all worked at Accenture on a project with the United States Postal Service. They were rolling out their first ever mobile devices — 320,000+ new devices along with custom software, to which we owned the development, rollout and support. We found that the devices in those early days were slow and WIFI connectivity was unreliable, among other issues. Despite being successful in that project, we often asked ourselves how we could gain more visibility into the devices in the field.

That one project was the first in over a decade of enterprise mobile experience where gaining visibility into what was happening on the devices, both individually and as a group, would have given our clients tremendous value by way of operational and process efficiency. Over the next ten years we continued working with clients to realize their mobile enterprise strategies. Among such clients were several major big box retailers, including The Home Depot, Haverty's and Floor and Decor. We were brought in to upgrade in-store and warehouse rugged devices on projects ranging from choosing the best device to migrating legacy systems to a new

MDM, validating MDM releases, validating hardware and developing and rolling out new applications. In connection with these rollouts, we were tasked to perform reporting and analytics through tools like Splunk and big data software stacks such as Hadoop Cassandra, SOLR, and Elasticsearch among others, both to help operations as well as validate business value for these projects.

One thing became clear across all projects: insight into what was happening on an actual device and a history of the device behavior, would have saved time, money and headaches. This is especially true in those war rooms where having no visibility into the device history means finger pointing between the development, support and network infrastructure teams.

Optiko - Enterprise Mobile Intelligence

The common thread across projects and clients was always data and insight, or the lack thereof. While MDMs and dedicated app analytic tools serve a necessary purpose, there was a hole that needed to be filled. And so we created Optiko, our enterprise mobile intelligence solution that bridges the gap between traditional MDMs and application analytics tools.

Our goal with Optiko was to give organizations a flexible platform for enterprise mobile intelligence. We believe companies should not spend time and resources building complex systems for gathering data. With Optiko, we deliver value to all levels of your organization, providing insights that allow you to monitor, analyze and act on business critical information. Optiko increases the effectiveness of your devices and applications in the field by leveraging this previously unknown data. Everyone, from the C-suite executives down to help desk support teams now have insight into how the business actually operates, giving them the tools they need to streamline processes, take corrective actions and become more productive. Optiko gives the enterprise a complete view of hardware and user events, systems performance and business process analysis in one centralized location. We work with any platform, on any mobile device, with any MDM. And we've made compliance and monitoring easy with notifications and alerts that can be based on your own particular requirements.

Continuous Visibility vs A Snapshot in Time

I have a MDM and an app analytics tool. Why do I need Optiko?

Mobile Device Management (MDM) tools have agents for keeping apps in sync and checking against rules while app analytics tools are great for illustrating how your apps are actually being used. With Optiko, we marry and compliment the two, giving device analytics that can correlate the data from both.

We provide visibility by reporting on device state and the packages and apps installed. While your MDM will install and/or remove apps, set-up device configurations and perform other actions on the device, Optiko provides reporting on the MDM actions not typically available from the MDM itself. While MDMs give a snapshot in time, Optiko provides both current and historical data.

Traditional application analytics tools are great for the makers of consumer facing apps. They give you app level reporting metrics, like a user flow map detailing how the app is used. App analytics look at individual apps at a time and track metrics showing how a user interacts with an app. While this is very useful for a consumer centric application, a company with multiple applications on a fleet of rugged devices need more information. In order to get a complete view of their business, they need to also know what's also going on on the devices themselves. Optiko gives our clients the ability to correlate app events with device events such as loss of network connectivity, weak signal, network switching, battery level, location and issues that could cause events or crashes such as CPU, memory and storage. Optiko gives our clients the same level information as app analytic software without buying an expensive app analytics package, as well the additional bonus of device visibility.

Business Cases for Enterprise ROI

Here are a few examples of how our clients have benefited from Optiko:

FINGER POINTING PARTY, AVOIDED

Most companies only have the ability to see what's happening on the server side or what information the app is sending to the server, but they don't have any information on what's going on with the device. This leads to war room meetings with different departments pointing fingers trying to figure out what happened when something goes wrong. If they could see what was actually happening on the device at any given time you could answer those questions in seconds. With Opiko, you have a history, a periodic sampling of EXACTLY what was happening on a given device at the time a crash or event happens, so it's easy to pinpoint network, application, device or security issues. In addition, Optiko identifies issues in the OS, network, hardware and software without relying on reports from end users. The result is reduced service and support costs, optimized device utilization and increased employee productivity.

SIMPLIFIED DEPLOYMENTS

From a deployment standpoint, whether you're deploying new devices or upgrading CE (legacy) devices to Android, Optiko provides additional validation that your MDM is working and that you've configured it correctly, the correct app versions are on a particular device, there is appropriate in-store connectivity and there are no crashes, app usage or network issues.

Optiko saves the back and forth between application development and network teams by having data readily available. Historically, the networking guys use a system of guesswork to figure out if network vs application issues are the cause of an event or a crash. With Optiko, we take the guesswork out of it by giving our clients, their network

and the application support and development teams an exact picture of what is happening on the device at the time of the event.

DEFINE USER BEHAVOIR

Understanding how your applications and devices are being used allows you to define user behavior so you can invest wisely. When you understand what apps and hardware are being used you can invest on those resources that are being used the most. When your business team requests enhancements to an application that's not being used frequently, you know user behavior so you know it's better to put that investment somewhere else.

Unlock Your Potential

We know what it takes to maximize and maintain complex enterprise mobility systems. Our goal is to support the enterprise by providing a clearer, deeper understanding of what's possible in mobile. With Optiko, we're using best of breed technologies, searching and querying through hundreds of millions of records and generating metrics so you have the ability to search through those records very quickly. The clear, concise dashboard shows you exactly what issues need your immediate attention.

We've invested in the technology so you don't have too. By building the tools ourselves, we allow our clients to focus on their core business. Optiko can get you further down the road, faster, so you can put your time and money into your core business.

ALAN LAMPA is a Principal at BlueFletch. He has extensive experience in Program and Project Management for large, complex systems implementations.

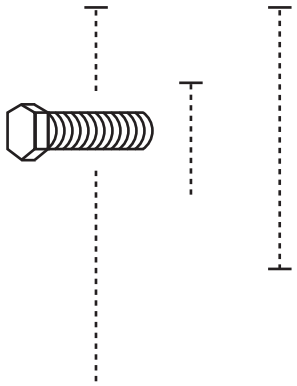
YOUR ENTERPRISE DEVICES DESERVE A CUSTOM LAUNCHER

By Lauren Lynn

Flexibility and enhanced user experience are key ingredients in advancing your business growth

Getting employees out of the back offices and onto the sales floor, streamlining apps to increase warehouse employee productivity or queue busting mobile payments are just a few ways that enterprise mobility solutions increase business value. But along with the benefits come a handful of challenges. How do you secure business and personal devices, deliver the right content to the right users and protect corporate data? Balancing security risks with the benefits of increased productivity is essential. Today's enterprise mobility demands flexibility, customization and security.

A launcher is the part of the user interface that lets device users customize the look and functionality of their home screen, launch mobile apps and make phone calls, among other tasks. At BlueFletch, we've built a launcher for our enterprise clients that allows them to customize their devices for the way they do business. Here are a few of the features we think every enterprise launcher should contain in order to optimize device functionality, streamline business processes and ensure device and app security.



Your devices function better when they are customized for your business.

Security

The enterprise must secure and manage devices, apps and content. A launcher can help accomplish this goal in a number of ways. Single sign on, locked settings and a guest mode all make devices more secure.

LOCKED SETTINGS

Imagine a retail environment with an in-store closed wifi, but when the sales associate steps out of the store they can connect to the mall's public wifi and all of the companies secure information is potentially compromised. Your launcher should limit all settings so that apps will not open unless the device is connected to the allowed wifi network.

SINGLE SIGN ON

Single sign on and nfc badge authentication allows for super fast sign-ins, but when used in conjunction with a SDK it also serves as your mobile application's identity provider, allowing gated access to applications and even feature access from within applications. In other words, single sign on can secure apps on a device the way you secure web apps on desktops. Role based permissions are also possible and can be passed along to individual apps, allowing edit permissions and screen access granted or denied within the applications themselves.

GUESTS WELCOME

A guest mode will allow clients, customers and vendors access to allowed information on the device while keeping corporate information secure. Guest mode can feature open applications such as gift registry, item lookup or customer check-in to be used without authentication.

KEEP CONTROL IN HOUSE

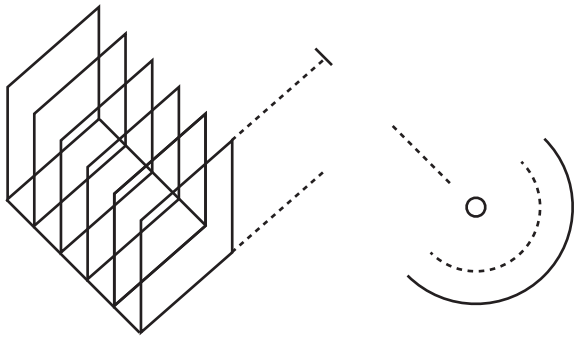
Controlling access to information in-house is another security feature found in a customizable launcher. For example, an organization could remove Google Play and replace it with an app store that is tailored specifically to that organization, in-cloud or on-premises, effectively limiting app availability to approved apps only.

Productivity

A custom launcher allows your organization to centralize the activities you need your phones to handle. Your devices function better when they are customized specifically for your business. Users can check work email, schedule meetings, reach out to contacts, work on documents and interact with business apps quickly and efficiently.

TIME IS MONEY

With a custom launcher, the device can launch your company's apps (and even deep link into the app) when employees scan bar codes or enter info into the search feature. It can even integrate with VoIP



services. Decreased navigation time and increased ease of use means employees get more work finished faster. A time savings of minutes per user per day multiplies into huge time savings when you're dealing with an enterprise fleet of tens of thousands of devices.

Single sign-on capabilities means employees are not signing in to every app individually. It also means that VoIP extensions and telephone numbers can be automatically assigned to devices or by user selected extensions, eliminating the need to support a separate paring application or complex manual processes.

GOOD UX = HAPPY EMPLOYEES

A launcher can be customized to have intelligence over the things you scan – for example, a sales associate scanning a customer's receipt will pull up the order, while an associate scanning a product barcode will pull up product information from a different app.

A customized application order allows employees to view the apps in a customized order for their job function, streamlining their workflow.

Predictive or contextual search features are another possibility when working with a custom launcher. Like google search within your apps, the search feature predicts what you're looking for and gives options to choose from. With a custom launcher you can customize specific search contexts to search within your apps and even your own data.

Secure apps are major concern for enterprise mobility, but having the Single Sign On capability means you don't have to sacrifice the UX experience for your associates. All your apps may be password protected but your associates save time by not having to login over and over.

Good UX and ease of use always makes for happy associates.

Flexibility

A custom launcher gives your organization flexibility in how you allocate devices, enabling every device to be customized for every employee, at any time.

PHONE INTEGRATION

VoIP user selected extensions allow for increased flexibility within your organization. With a custom launcher, organizations don't have to assign an extension to a device. It allows your organization to assign an extension to a user so that extension follows that user, regardless of device. So a team member in the paint department doesn't have to use a paint department phone – he or she can log into any device and the team member will get the paint department extension assigned automatically.

NOTIFICATIONS

Flexibility of use is also exemplified in notifications that follow the user, not the device. Custom enterprise launchers allow for automatic topic subscription, making it easy to send targeted notifications based on location, site, role, active directory group, etc. For devices that do not have Google Play services, a custom launcher can push notifications from the server, keeping all information in-house and secure.

DUAL INTEGRATIONS

The ability to log in with multiple identifications increases device flexibility. Someone from the corporate office can pick up a device at a store, log in with their corporate credentials and have access to all of their information there on the device. Guest mode is another example of how a custom enterprise launcher provides increased device flexibility.

Optimize Functionality to Advance Your Business

Enterprise mobility is an essential element in business today. Going mobile allows businesses to securely communicate and collaborate more efficiently, opening up new value and growth potential. In today's enterprise mobile world, business users expect and deserve new functionality to make them more productive and successful at work. Providing your devices with increased flexibility and enhanced user experience is a key ingredient for advancing your business success.

LAUREN LYNN is the Marketing Manager at BlueFletch. She coordinates marketing, scheduling, and anything related to keeping the lights on.

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Saving minutes per day per user multiplies into huge savings when you’re dealing with a fleet of tens of thousands of devices

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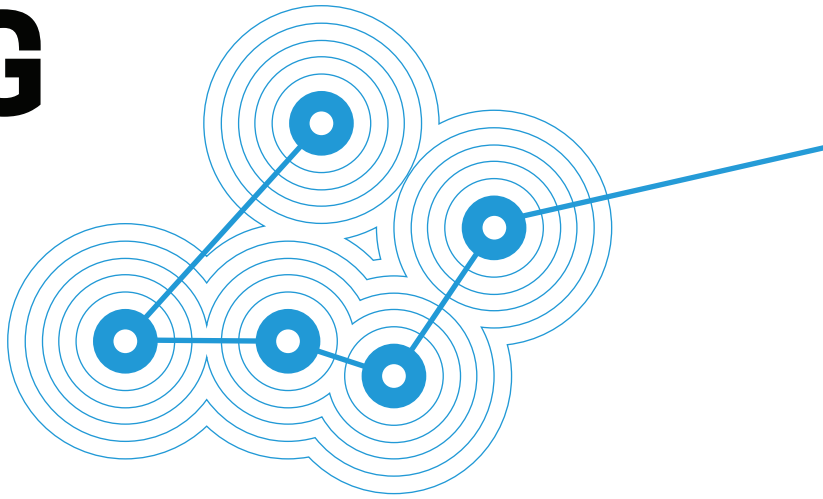
THE LOCATIONING EVOLUTION

By Tony Gutierrez



Location Analytics, or "locationing" is an emerging technology field for tracking mobile users' behaviors in physical spaces. Just as web analytics provide organizations with valuable feedback into the most effective spaces in their online presence, location analytics will allow for new insight into people's interaction with the floor plans, staff, displays and products in the consumer environment.

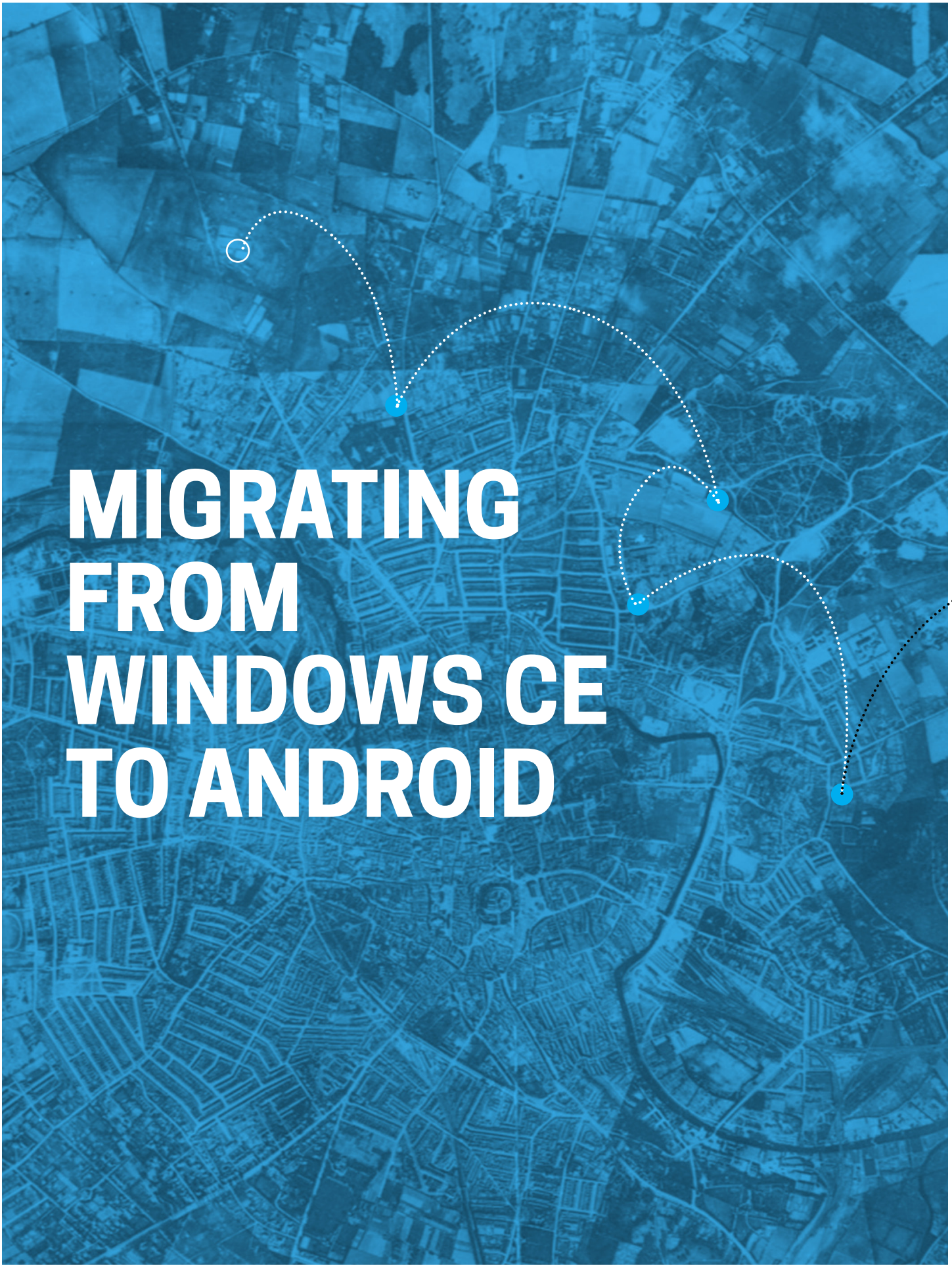
Statistics show that well over 50% of consumers bring their smartphones into the brick-and-mortar retail experience. Zebra's MPact platform is designed for low cost and rapid deployment, in order to start harvesting this valuable mobile location data with ease. The system uses a hybrid combination of WiFi for coarse positioning, and small battery operated bluetooth beacons for furthered accuracy. This provides three tiers of locationing for customer engagement - presence, zone, and position. The backend software offers flexible configurations for storing and analyzing the data.

Retailers and other businesses implementing the MPact system have been able to leverage this window into customer behavior in a number of ways. Casinos are tracking the most popular tables, in addition to staffing levels, on the game floor. Retailers have discovered obstacles preventing customers from easy access to certain product areas, and have been able to optimize traffic flow and wait times at fitting rooms and checkout points. The MPact platform also provides Android and iOS SDKs that allow businesses to provide on demand, location based interaction with their in-store app users. These can take the form of instant coupons, proximity based marketing, or the ability to request the assistance of a nearby associate.

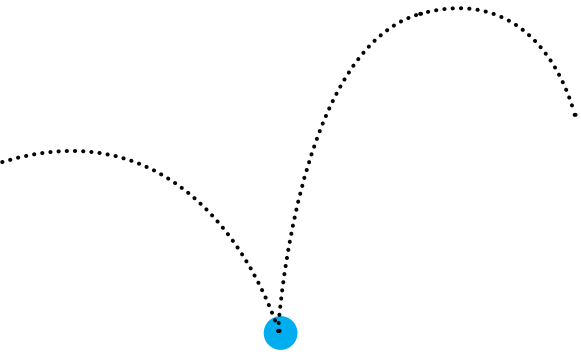
Organizations have also been thinking "outside the building" and have used locationing to track visitor behavior among different sub brands and branches, as well as the engagement effects of local sponsorships and promotional events. Aggregate location analytics over extended time periods provide even more detailed insight into a customer base, and help businesses understand the habits of repeat customers.

At BlueFletch, our mobile consulting experts have recently seen increased interest in location analytics from our clients. In the past there were some primitive location tracking solutions using GPS, very dense WiFi access points, and even video camera image analysis, but these prove to be expensive and difficult to install and calibrate. We use inexpensive standalone bluetooth beacons for some solutions where a small number of individual beacons are easy to catalog and respond to. For clients who need comprehensive tracking, data storage, analytics, and drop in mobile SDKs, the MPact product is a valuable addition to our toolbox.

TONY GUTIERREZ is an Architect at BlueFletch. He brings years of experience to developing our mobile projects.


MIGRATING
FROM
WINDOWS CE
TO ANDROID

As you consider moving away from Windows CE, here's a checklist to help guide your process



By Brett Cooper

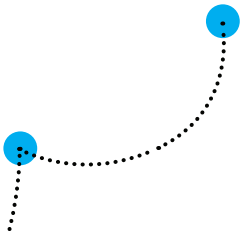
Over the next 5 years, Microsoft is going to stop supporting the Windows CE OS (also known as legacy windows mobile), the operating system that has been the anchor of enterprise rugged devices. Windows CE has gone through various iterations since 1996, but its core has effectively remained untouched. Microsoft introduced Windows Mobile 7, Windows Mobile 8.1, and Windows Mobile 10 over the last few years, but Windows CE has continued to own most of the ruggedized handheld market.

As the newer Windows Mobile editions have failed to meet the needs of the enterprise, we have seen a large push towards Android for purpose built devices (such as the Zebra TC70 or Zebra TC8000). These rugged Android devices do a great job of providing the enterprise features and functionality missing from the new Windows Mobile ecosystem. Examples we commonly point to include custom security APIs, hardware integration APIs, and more robust MDM capabilities.

Our team at BlueFletch has helped a number of enterprise clients with the migration process of moving from their Windows CE devices to modern Android devices. When we started with enterprise CE to Android migrations in 2012, the device options and the technology availability was not as robust as it is today, but with more options has come more decisions.

We spend a good deal of time sharing our experience and approach with companies. We have a full planning checklist of the items we talk companies through at our website.

The following is an excerpt from that checklist on Application Technology selection.



Rapid changes in the development landscape can quickly antiquate your technology

Application Technology

There are numerous aspects to consider when making technology approaches for the technology that you can leverage for your application conversion. When we evaluate these technologies we compare them to your developer resources (do you have talented web developers, Java developers, or .NET developers), your device landscape (do your apps also need to support iOS or Web), and your application experience requirement (e.g. how fast does it need to be). The primary application choices we see are:

OFF-THE-SHELF

If there is a pre-built application that meets all of your business needs, this may be the quickest path to production. The main drawback of off-the-shelf software is typically the lack of ability to customize for your specific business cases.

TERMINAL WRAPPING

If your legacy CE applications are just terminal screens, a quick path to consider would be a terminal wrapping tool like Wavelink's Terminal Emulation or Zebra's All Touch Terminal Emulation. These packages allow you to wrap terminal apps in a UI that can support custom keyboards and hardware interfaces (scanner, etc).

CROSS PLATFORM TOOL

Cross platform tools like Xamarin, Appcelerator, Tracerplus, or RhoMobile tout the promise of "write once… run anywhere". Of these tools, Xamarin is our preference (we have been using it since 2010); It allows you to write code in C# and compiles it down to Native Android or iOS. Additionally, Microsoft has recently purchased Xamarin and has made the licensing of the runtime free from license cost. One of the other benefits of Xamarin is the recent creation of Xamarin specific tools by companies like Zebra. The main drawback of these tools is that you still need to understand native development on Android if you are going to perform any complex UI or application functionality (what we call "the last 20%").

CONVERSION TOOL

Of the "Automated" .NET to Android conversion tools, iFactor is the most mature option. iFactor converts legacy C# CE applications into Xamarin application projects to allow them to run on Android. ITR iFactor was acquired by Zebra in 2015 and the iFactor solution is now well supported on the Zebra Platform. If you have a scenario with simple CE apps where you need to convert them quickly, this may be a good option to evaluate.

HTML/WEB CROSS PLATFORM

If you have a strong group of web developers on your team, a hybrid web application may be the way to implement your next generation of applications. Cordova/PhoneGap has become the de-facto standard for wrapping mobile hybrid web apps. Frameworks like Ionic, Angular, and React have focused on enabling developers to write good looking mobile applications using web technologies. React Native has also introduced the concept of compiling web code to Native (similar to the cross platform tools above). One of the drawbacks we have observed with Javascript based tools is the rapid change in the technology landscapes can quickly antiquate your technology and make it hard to hire developers with specific experience down the road.

NATIVE ANDROID JAVA

From a performance and long term supportability standpoint, we prefer writing Android applications by leveraging Native Android Java. Google continues to make leaps and bounds in the development tooling they provide for free for native Android development. Native Android development is becoming one of the most common skillsets in the global development community (due to low barrier to entry and free tooling). Native Android development will also give you the most performance out of your applications, compared to other options.

Proof of Concept App

When there is a large amount of debate around the application technology selection, we suggest building out a core business flow in multiple languages. These bake-offs can tell you a few things:

- Are there any edge cases that the technology does not accommodate well?
- How quickly can something be developed in the technology?
- How difficult is the code for the existing team to understand and maintain?
- How performant is the tecnology on my device/devices of choice?

BRETT COOPER is the Founding Partner at BlueFletch. He specializes in strategy, infrastructure, project management, security, and enterprise system implementation.

POC CHEAT SHEET

By Richard Makerson

Kick the tires before investing in your next mobile solution.

As companies continue to focus on mobile strategies that require heavy investment in software, tools and devices, they are naturally interested in doing their due diligence and kicking the tires before pulling the trigger on their next mobile-related investment.

We are entering a second wave of ruggedized device replacements for the enterprise. Here is a simple cheat sheet of things to remember when running your next enterprise mobility proof of concept.

DEFINE THE PROBLEM

This may seem like a no-brainer when thinking about replacing legacy devices but think about all the pieces that support mobile applications. Important pieces to consider include:

- Infrastructure - database, server, build servers, device management tools, networking hardware
- Technology - tooling of developers, cost of tools (IDE, custom debug cables, etc.)
- Device operating system

Is your organization locked into supporting an expensive legacy technology and you are tired of paying their ransom? Is it hard to attract or keep new talent? Are you trying to future proof your mobile strategy for the unknown 'next big thing'?

Define the problem, agree on the audience and establish what will make this POC successful.

CONSIDER MANY OPTIONS

Once the problem has been defined, spend time reviewing the history of the problem and understanding current constraints. Some companies want to protect against re-tooling developers, others do not want to invest in re-training end-users, while some are open to making a decision that is the very best fit for 'right now'.

Talk to your end-users and spend time observing how devices and applications are currently being used. This is a great time to consider investing in UX to make your applications more user-friendly.

PRIORITIZE & LIMIT PREVIOUS EXPERIENCE

There is now a list of options and opinions from others in front of you. What do you do next? Prioritize. Not all problems or options are created equal and some options will have a greater return on investment (ROI) than others. If this is the first POC (or first iteration) I would suggest the following:

- Log your sessions - It is important to remind people why something may not be in included to prevent scope creep.
- Identify the needs and motivations of your end-users - The end-user in the enterprise world is often lost in the shuffle, but it's important to remember that good UX saves time (and therefore money).
- Focus on ROI - concentrate on solving your most critical issues and the benefits expected with the new solution.

EXECUTE

Ready, aim, fire. Right? In theory, executing on a POC should be this easy but beware of scope creep. This is usually the time when small additions to the scope of the project are added. It is important to keep your POC focused on the problem at hand. If you took good notes during your prioritizing phase then you have the ammo to protect your scope and keep your POC on track.

Having user stories and a test plan will also help when collecting data and feedback from end-users. Collecting measurable, consistent data is important because the next step will require the data input.

LEARN (RINSE & REPEAT)

This is the fun part (to me at least). Gather feedback from end-users, developers and the supporting business groups. Collect the data that was captured as part of this POC so you can measure its success. Discuss areas of improvement with your internal team and vendors. Depending on the size of the organization, there may be an opportunity to negotiate changes or require improvements from software and hardware vendors.

And now, it is show and tell time. Use this as an opportunity to get business groups and leadership excited. Determine if goals were met and if there is room to learn more or test options that had lower priority. Do not forget to document! It is easy to get excited or let down and forget to document the outcomes of a POC.

RICHARD MAKERSON is the Managing Partner at BlueFletch. He has extensive technical experience in native, cross-platform and web-based mobile app development.

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OUR PERSPECTIVE

WHICH MOBILE OS PLATFORM IS READY FOR THE ENTERPRISE

By Brett Cooper

With Windows Mobile and Windows CE effectively end of life, enterprise IT organizations are now forced to strategize a move to modern platforms. This article will walk you through our experiences, giving you a glimpse of our point of view on Windows Mobile 10, Android, and iOS, how best to utilize each, and insight into how we evaluate an enterprise mobile platform.

BlueFletch Experience with Windows, Android and iOS in the Enterprise

WINDOWS CE

We have experience using Windows CE in transportation/logistics, warehousing, retail, field services and MDM and device management. Our team's projects include the United States Postal Service's first ever rollout of 320K+ mobile devices, and we have worked with Windows CE deployments with install bases ranging from 20-80K devices.

WINDOWS HANDHELD 8/8.1

Our experience with Windows Handheld 8 and 8.1 is limited to POC prototyping, device support tooling and evaluations. We spent 12 months on architecture and design for one client but found too many shortcoming and eventually the program switched to Android.

ANDROID

Our experience with Android in the enterprise is robust. We have worked with close to 100K devices in three major national big box retailers. Devices types include Zebra MC40s, Zebra TC70/75s, Honeywell CT50, BlueBird BP30 and Toshiba Touchpad X1. Android has by far been the most successful platform for enterprise mobile.

iOS

Our consumer facing apps for the food and beverage, retail and healthcare industries often utilize iOS and have included loyalty and BOPIS applications, surveys, consumer beacon offer applications and mobile payment applications for consumers, showrooms, managers and employees on iOS devices and tablets.

Evaluating Enterprise Mobile Platforms

When evaluating an enterprise mobile platform, the following are key areas we factor into our consideration, including developer resources, development tooling, enterprise use cases, end-user experience, and deploy/support.

DEVELOPER RESOURCES

As we evaluate a platform, we take into consideration the short term and long term impact on a company's development resources.

The following are some key considerations:

Current Resource Availability
Are there enough developers available to support development efforts? Android developers outnumber iOS 4:3 and Windows Mobile 20:1.

Resource Costs
How expensive is it to acquire talent skilled in this technology? According to a recent survey by The Register, Windows Mobile developers are twice as expensive as iOS or Android developers.

Future Availability
Over the next 5 years, will the skills associated with this platform be widely available? The overall trends of interest in Windows Mobile development are continuing to decline. Major universities, including MIT, GA Tech, and Stanford, currently offer classes in iOS and Android development, but do not include Windows Mobile in their curriculum.

Conversion Costs
How easy will it be to convert current development resources to support the platform? Bootcamps and training for iOS and Android are widely available. Xamarin is the current primary bridge language for C# developers, but still requires native iOS and Android experience for any complex UI. Traditional Java dev and C# dev are very close to the constructs used in Android Java Development.

DEVELOPMENT TOOLING

When developers are comfortable and productive you can expect the absolute best from them. Having community support, developer tools and documentation are just the start of things you need to consider when making a technology selection.

Below are a few more key considerations:

Software Dev IDE
The IntellJ product, on which Android Studio is based, has been around since 2001 while Visual Studio was introduced in 1997. Google continues to invest heavily in the growth of Android Studio and is on the 2.0 beta release as of Feb 2016. The cost for Visual Studio ranges from $499-2600; Android Studio is free of cost. Xcode is free with OS X.

Hardware Requirements
Do I need new or different hardware for development? To develop Win 10 Mobile with Visual Studio, you need Windows 8.1+ and a System that supports Hyper-v. Android Studio supports Windows XP+, OS-X, and Linux. iOS development requires an Apple computer running OS X.

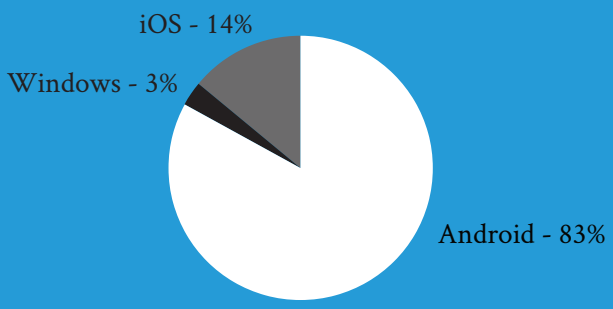
Nexus devices provide widely available reference hardware for Android OS level testing and modification. Reference hardware for Windows Mobile is limited in availability and OS level modifications are restricted to Microsoft. iOS has no concept of OS level builds.

Build / Automation Flexibility
How effectively can you build an Agile Continuous Integration process for a platform?

Android supports continuous integration build tools such as Jenkins, Circle CI, and Travis CI. Xcode has multiple integration points for automated build including Jenkins and Xcode Server. Microsoft TFS supports CI, but requires additional licensing costs. There are limited open source examples of CI with Windows Mobile.

Platforms by the Numbers

WORLDWIDE SMARTHPHONE OS MARKETSHARE



GITHUB PROJECTS AVAILABLE

Android
314,419

iOS
114,814

Windows Mobile
862

Libraries and Community
How available are libraries and community support for development acceleration?

	WINDOWS MOBILE	iOS	ANDROID
GitHub Available Projects	862	114,814	314,419
Stack Overflow Question Threads	20,914	414,925	801,915
Cordova / PhoneGap Plugins	85	865	1,035

ENTERPRISE USE CASES

Each enterprise has its own culture and the impact of change will vary. When determining the cost of change, below are some key considerations when selecting a specific technology.

Hardware Interfaces
Are custom hardware APIs available to interact with specific devices? For enterprise hardware interfaces such as custom USB, payment interfaces, or scanner hardware, the peripherals must be controlled through Microsoft's APIs, which are limited when compared with Android hardware APIs (e.g. Zebra EMDK). Apple devices also share limited hardware interface APIs.

Enterprise APIs
How robust are the APIs needed to perform enterprise functionality? Microsoft controls APIs to perform platform or system level functionality (e.g. device management, network state, time setting, Bluetooth connections, background processing). Our experience with Windows 8.1 has shown limitations in the ability to build enterprise grade software (similar to limitations in iOS). Android vendors like Zebra and Honeywell do a good job exposing secure enterprise APIs.

Consumer Software
What has existing software done on the platform?

The easiest way for us to answer the question: "Can it be done in this platform" is to look for existing off-the-shelf applications that perform a specific or similar function. The lack of breadth of Windows Mobile apps makes it very difficult to ascertain the possibility of specific functionality without re-engineering. Android and iOS have plenty of examples, but Apple has been known for deprecating or tightening APIs between iOS releases.

Ruggedized Devices
How mature is the Platform in the device type ecosystem? Android has a multi-year head start over Windows Mobile 8+ in ruggedized devices and overall number of available devices in the ecosystem. Apple has no ruggedized support, but there are a large number of 3rd party cases that attempt to fill the need.

END-USER EXPERIENCE

The end-user experience can sometimes be the most overlooked area to gain productivity and increase the return on technology investment. Saving 10-20 minutes a day at scale across a workforce adds real value to the bottom line. Below are some key considerations when evaluating the impact of UI/UX when selecting a specific technology.

Platform Familiarity
How familiar are end-users with the platform? Platform familiarity helps users move quickly through basic functionality on a system. Android is far more familiar to most users. Android has 52% of North America consumer market share (82% globally) compared to Windows at 2.6%. In addition, mobile device usage skews heavier toward Android in the sub $75K income level. While iOS was the initial leader in the mobile app space, development hardware requirements have caused limitations outside of high-end developers.

Design Patterns
How common are the visual design patterns for the platform? Design patterns in UI/UX for mobile devices have impact around how quickly how quickly users can visually perform tasks. When a user is not familiar with an OS they will typically look for patterns similar to what they know (e.g. iOS and Android). The guidelines for Universal Windows Platform have been met with mixed reviews and have been found to be difficult to understand (e.g. pagination, swiping down to close an app, and lack of visual cues for action areas).

Training
How much training will it take to become familiar with the OS? Based on the above two items, we look at how easy it is to re-train users to understand the UI/UX paradigms for a platform. With Windows 8.1 we have observed that the lack of rapid penetration of Windows 8 and 10 into the desktop space has slowed users' ability to pick up on new UI Paradigms. Windows 8+ still has less than 26% of the Desktop OS market share. Due to market adoption of iOS and Android, most users easily grasp visual concepts in Android or iOS apps that follow the platform design standards.

DEPLOY AND SUPPORT

We evaluate the impact of deployment and support based on how easy it is to install, but also to support on day 2.

The following are some key considerations:

MDM Integration
How well do MDMs support the platform? As iOS became the de-facto carry devices for executives in the late 2000s, MDM providers such as AirWatch, Soti, and Good flocked to build enterprise support for iOS into their products. iOS is the most mature and securable platform from an MDM standpoint. Growing adoption of Android in the enterprise has spurred MDM providers to build more robust Android support over the last 4 years. Conversely, limited Windows Mobile adoption coupled with Microsoft pushing IT solutions (In-Tune, SCCM) have resulted in less than adequate MDM support for WEH.

Analytics Tools

What tools are available for enterprise analytics for the platform? Application Analytics tools like Crashlytics or Hockey currently only provide support for iOS and Android.

OS Updates

How does the platform handle patches and OS updates? Historically, companies have had issues with automated iOS platform updates. Apple has started to focus on more of the enterprise control scenarios. Windows Mobile suffers from many of the same OS update problems as iOS, but the limited consumer adoption makes the problems with OS patches more likely. Android devices are generally good around supporting patch or OS update pushing through MDM solutions or through side-loading.

KEY TAKEAWAYS

Windows Mobile 10

Microsoft has stated that they are focused on closing the gaps in the above areas with Windows Mobile 10. Based on the pace of releases and their continued delays, we believe that the platform will continue to remain 1-2 years behind Android from an enterprise readiness standpoint. If an organization is planning on going with Windows Mobile 10 (WEH), we recommend that they take into consideration the current shortcomings of the platform and build in additional operational and project cost to compensate for the areas that we have called out.

iOS

Apple is still the leader in consumer mobile experience. In scenarios where the devices will be used for limited shifts in an executive or consumer facing role, iOS may be a good selection. Some of the hardware limitations (not mentioned in this POC) may hold Apple devices back from being good multi-shift or line of business (LOB) supporting devices.

Android

Early concerns around platform security due to its open-ness have made some companies slow to adopt Android (similar to Linux adoption in the 2000s). For inside-the-four-walls devices and scenarios where companies want to have a highly customized end-user experience, Android is the way to go. Despite iOS being ahead of Android in certain development tools, we still perceive Android as a better long term bet in the enterprise.

BRETT COOPER is the Founding Partner at BlueFletch. He specializes in strategy, infrastructure, project management, security, and enterprise system implementation.

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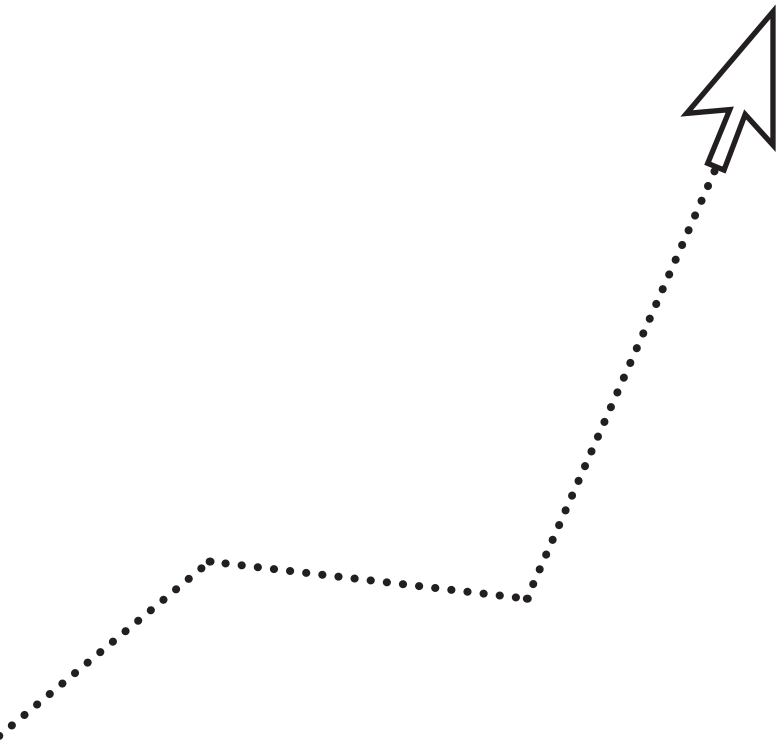
HOW TO TEST THE EFFICACY OF YOUR OMNICHANNEL

By Richard Makerson

What's your organization doing to stay competitive?



The "Buy Online Pickup In Store" offering has become a popular addition to most retailer's omni-channel strategy over the last few years. Flexible fulfillment programs that integrate all three sales channels – online, in-store and mobile apps – can reduce shipping costs for customers and increase overall sales by drawing more shoppers into the store. BOPIS improves customer satisfaction and allows traditional brick-and-mortar retailers to more effectively compete with major online stores.

In an age of Amazon Now/Echo, Alibaba, Mobile Payments and other disruptive retail technologies, customers are demanding and expecting more from brick-and-mortar retailers. Retailers must acknowledge these expectations or risk losing out to the competition. Today's savvy and busy shoppers want to save two things: time and money. BOPIS as part of a bigger omni-channel strategy can deliver on both.

Insight based on actionable data allows you to measure your return on mobile technology investments and identify where to invest in future improvements

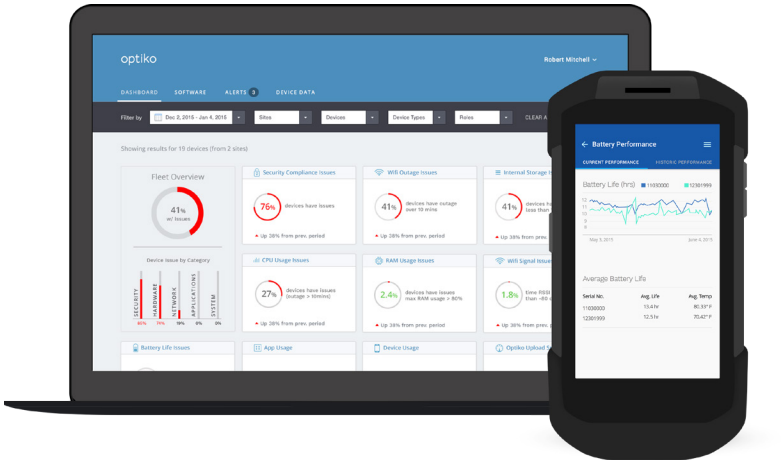
Strategic advantages of well implemented BOPIS include:

- More unplanned purchases when shoppers visit the store (40% vs only 25%).
- Faster delivery.
- Connecting customer data from online to offline for insights down the road.
- Larger basket sizes.
- Higher conversion rates.
- Sometimes it's more convenient than waiting for the item to be delivered.
- Save on shipping costs.
- Shorter overall time to receipt of an order compared to ordering online.
- Price matching now ensures the most competitive price.

Over the last 8 years, we have had the opportunity to implement the mobile applications for a large number of retail BOPIS solutions. One of the key differentiators we have found in successful implementation is to incorporate analytics to measure the experience. We have done this multiple ways, from building bespoke dashboards to customizing Splunk reports. Recently, more retailers have been leveraging our mobile analytics offering, Optiko, to provide this competitive advantage. Access to actionable information from Optiko analytics allows our clients to gain insights so that applications and associate training can be improved based on actual data – not causal feedback. Gaining insights based on actionable data allow our clients to measure their return on mobile technology investments and identify where to invest for future improvements.

How Buy Online, Pickup in Store (BOPIS) Works

From placement to delivery, there are certain actions that always take place during the buy online, pickup in-store process. When an item is ordered online and the pickup in-store option is selected, the customer's local store receives that order for fulfillment. Every retailer implements the customer fulfillment, item staging and customer delivery steps slightly differently. Executing this strategy correctly can move a retailer closer to winning the hearts and pockets of a customer. Moreover, there are some brick-and-mortar retailers that are using BOPIS as an opportunity to measure, track and fine-tune each step in the process to further separate themselves from the competition.



Many of our clients now use Optiko for analytics. Visit www.optiko.io to learn more.

Item Picking

When an order is placed online and a store receives the order for fulfillment, typically, a notification is sent to available store associates mobile devices. Some questions retailers should be asking in order to understand and improve the picking process include:

- How many store associates received the notification?
- How long did it take a store associate to acknowledge a pick request?
- How long does it take to pick an order?

Knowing the answers to these questions is the first step to improving the picking process. Timing the picking process and mapping the picking route also help retailers improve the fulfillment process and save time.

- Which associate is the 'quicker picker'?
- Do some items take too long to stage? Should these items be available for BOPIS?
- Can I use data from pick order to determine in-store navigation?
- How much of my time overall is being spent picking?
- Do I have a mechanism for identifying if associates are too busy interacting with customers to pick order items?

Armed with this information from Optiko, our clients are able to dive deep into a process that is usually overlooked. Optimizing staff through training feedback and deploying associates in a way that is most efficient will set the tone for a fine tuned order fulfillment.

Item Staging & Ready for Pick-Up

Once all the items for an order have been picked and it is ready for customer pick-up – what happens next? Is your organization automatically providing feedback to the customer on order status? At this stage in the process it is important to:

- Use the customer's preferred type of communication (phone, email, text)
- Track when customer communications are sent
- Measure open rates
- Communicate any special instructions up front (e.g. will the customer be required to pick-up certain items in a location other than the front of the store)

Allow customers to provide their expected time of arrival (i.e. reverse Comcast appointment time).

Brick-and-mortar retailers that have customer facing mobile applications can leverage mobile devices to provide an experience that is seamless to the customer. BlueFletch has helped retailers leverage beacons and geo-fencing to provide actionable data to customers and associates. Automatically triggering tasks and providing feedback to the customer reduces frustrating experiences, including:

- When orders are not ready when the customer arrives
- When the items need to be retrieved or found from the back
- When the customer needs to take delivery in another part of the store.

Retailers that leverage the locations of the customers will know when they are on the way to the store and can have the store associates prepare the order for delivery. If the items are over-sized and need to be picked up from a special location, the customer can now be made aware before they arrive in the store.

Order Delivery

Hopefully by now the customer is in the store and at the right location to pick-up their order. The worst thing that can happen is having an awkward experience that takes longer to deliver than if the customer picked the items themselves and used your regular checkout process.

When the customer arrives to take delivery of their order there are a number of opportunities to leverage Optiko to capture key data points, such as:

- The total time of the delivery interaction
- How is the customer being looked-up/searched (e.g. receipt scan, email, telephone number, order number)
- Customer receipt preference
- Application Exceptions (e.g. Are there exceptions in the process that associates do not report that could provide a better experience?)

Although actionable data is key to improving any process, there are a few more things that retailers should consider when implementing their buy online, pickup in-store offering:

- Offer discount codes or coupons that expire the same day that the BOPIS item is collected.
- Design the in-store pickup area to incorporate popular items customers can pick up and easily purchase
- Train your employees to cross-sell and up-sell products or services
- Make it as easy as possible for your customers to receive their products by offering designated parking spots, clear signage, and convenient checkout locations that will encourage customers to keep using your service

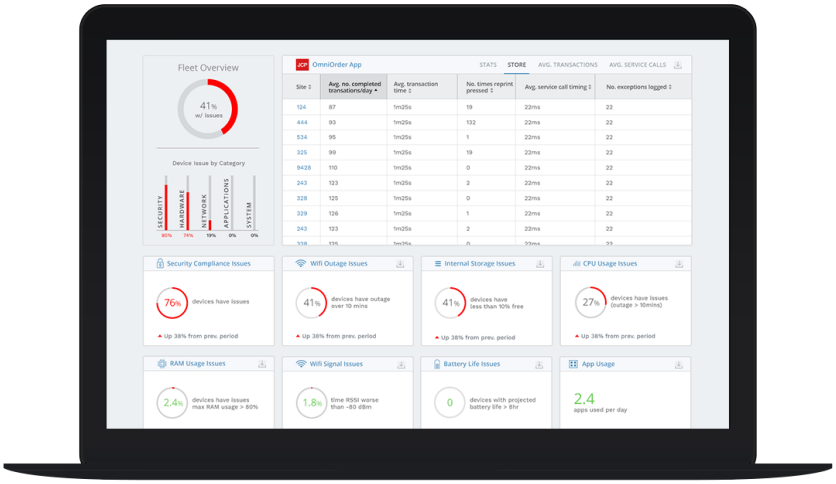
Process Efficacy

Many organizations are required to provide a benefit case when requesting budget for a technology project. Typically, what happens is that a business case is presented, a business owner will fight for the project and the project is either funded or not.

When the project ends, if it was under budget then you live to fight another day and if it was over budget, hopefully it wasn't a total disaster. What rarely happens is the retrospective to reconcile if the project actually delivered on it's benefit. Optiko's analytics provide a clear picture during a project retrospective. For the BOPIS process a project examination could include:

- Store Associates – High Performers vs. Lower Performers

BOPIS is an opportunity to measure, track, and fine-tune each step in the process to further separate yourself from the competition



Optiko's analytics bring insight and clarity to project retrospectives.

- Identify our best up-sellers and what sets them apart
- Why are certain associates quicker at picking than others?
- Are customers sharing their experiences socially at a particular store

- Identify process areas that can be automated
- A/B test of customer interactions and if they provide a better experience

• • •

The ability to buy online, pickup in-store has been around for a while and customers have come to expect this option from brick-and-mortar retailers. What is your organization doing to stay competitive and ensure that customers are receiving the best BOPIS experience possible? Accurate data can help organizations make well-informed business decisions. Our retail clients are leveraging Optiko to gain insights on previously unknown data points. To find out if there are gaps in your enterprise mobility processes we would love share more about Optiko or discuss your other needs around mobile analytics.

RICHARD MAKERSON is the Managing Partner at BlueFletch. He has extensive technical experience in native, cross-platform and web-based mobile app development.

THE COST TO BUILD A MOBILE APP

A lot more goes into building an App than just "sticking some screens together." Here are a few guidelines to help you understand how to price out your App.

By Brett Cooper

As a partner in a mobile software company, I frequently get peppered with the following types of questions:

"So my neighbor has an idea to start a company like YouTube for dog walkers ... how much will it cost to build a mobile app for it?"

My answer is typically:
"It depends... I would need a lot more detail to be able to give you a rough estimate"

There are a lot of variables that go into building a mobile app.

I like to use the analogy that estimating building a mobile application is like estimating a home build out:

- What kind of house are you building: Shanty, trailer, condo, McMansion, historic renovation?
- How quickly do you need your house to be built?
- How many rooms? How many bathrooms? Garage? Basement?
- What material do you want to use to build your house?
- What amenities are you looking for in your house?
- How much are you prepared to pay to maintain your house?

As you start to answer all of these questions, it helps you narrow down how much it will cost to build your house, how long it will take to build, and how much it will cost to maintain. In software, this is know at the Scope triangle of Resources, Time, and Quality.

When I do scoping of a mobile application, the following are the question areas that we will typically dive into before we try to SWAG out an estimate.

- General sense of the application flow: How many screens in the app, how does the user flow through the app
- How do you plan on monetizing the application: For Sale, In App purchases, complimentary services, app will produce lift on existing offerings, user data monetization

- Complexity of the data pieces involved in the app: video, audio, location,
- Authentication types: LDAP, Facebook, Twitter, custom
- Existing systems and pieces that you have in place: Data, authentication, payment
- What interactions does the app have to make with device hardware? (For example, camera, microphone, barometer, accelerometer, compass, scanner, NFC, RFID, Bluetooth)
- Platforms: iOS, Android, Windows 10, Windows CE, Hybrid
- Performance Requirements: How quickly does the app need to respond to user requests?
- Availability Requirements: Does that application need to be available in disconnected states (e.g. offline)
- Security Requirements: PII, HIPAA, PCI, Encryption, Non-Repudiation, etc
- What payment types do you plan on taking: Credit card, PayPal, Apple Pay, BitCoin, etc
- DevOps: Capabilities of your current teams, your current deployment environment, server infrastructure, testing tooling, deployment tooling
- Support: How much support will be required, how will you handle analytics, how often?

The above are some of the bigger areas we will review as we dive into application scoping with customers. In certain situations, estimates require a full week of discovery sessions.

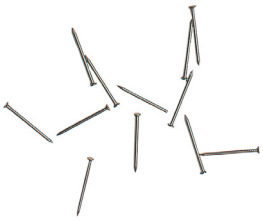
"Wait" you say. *"My brother in law doesn't care about the above process... he just wants to know how much it will cost to build an app exactly like _____."*

OK… I get it! You just want me to give you an estimate of what it would take to copy someone else's app.

Given that request, the following are some estimate buckets I think it would cost to clone some popular applications.

Note: I have made some basic assumptions around the work involved:

- The estimate included Design (UX and Technical), Development (Mobile and Backend), Testing, and Deployment for one iteration on the current form.
- For larger companies they have existing systems of record for the data, you would just have to build new APIs to interact with that data.
- For complex apps with new backend functionality, you would need to build that functionality from scratch.



- Note this estimate is to "clone" one of these apps, these guys have all invested a lot of time iterating to the point where they are today.

Enough with the assumptions, here is the list:

App pricing guidelines:
FROM $10,000 TO $1,000,000

LESS THAN $10,000

Apps that cost less than $10K to build are typically pretty simple applications that have one screen and one function.

Flashlight App
Nothing in the app is exceptionally complex or could not be found with some quick research. This app started out pretty simple, but has iterated multiple times with lots more functionality. If your hired developer doesn't have a ton of experience, it may wind up costing you more than $10K to clone this one.

Coin Flip
This app is basically a coin selector with a random flip generator. I am pretty confident that most developers would be able to clone this for under $10K.

Bubble Level
Bubble level uses the gyroscopic sensor in the iPhone to mimic the behavior of a real life level. I am not sure why you would need to use a level while driving your car, but they seem compelled to include it in their features.

$10K-100K

Apps in the $10-100K range typically have more complex UIs and integration into data systems.

Sleep Cycle Alarm Clock
Sleep cycle measures your sleep by tracking vibrations caused by movement in the night. Features of sleep cycle include integrating with Apple's health kit, leveraging the accelerometer on the device, and alarm functionality.

Banana Republic App
Banana Republic app illustrates the complexity of omni-channel retail. Easy browse and search features are only the beginning. Users have the ability to buy across GAP Inc. stores with one easy checkout, scan product bar codes for alternate sizes and colors and receive special offers and services.

Tasker
Tasker allows you to perform tasks based on contextual rules (application, time, date, location, event, gesture) in user-defined profiles. An example of this would be "when my location changes to office, turn off wifi" or "enable auto-rotate when I launch youtube app". The complex set of rules and system integrations makes this a very useful tool.

$100K-500K

Apps in the $100-500K range typically have complex screen flows, data synchronization, and security controls in place.

Slack
This team communication tool has proved to be indispensable to the team at BlueFletch. Features include real time messaging and file sharing, integration with hundreds of apps (Dropbox, Twitter, Google Drive) and configurable notifications. And it instantly syncs across devices.

Nest Mobile
Nest Mobile App allows you to control your Nest Learning Thermostat, Nest Protect, Nest Cam and Dropcam all in one place. Integrating thermostat control, smoke and carbon monoxide alarm notifications and security camera footage keeps you connected to what's happening in your home no matter where you are.

Beyond Pod
The Beyond Pod podcast app lets you access hundreds of thousands of audio and video podcasts from around the world. Extensive search and import features paired with customizable connection settings, configurable "smart" playlists, and integration with feedly lets you experience your content the way you like it.

$500K-1M

Apps in this range start to have some very complex security or data interaction functionality (in addition to a complex UI).

Fitbit App
Features include tracking and recording workouts, monitoring heart rate, food and hydration logs, and measuring your sleep. Add to that the ability to set and monitor goals, sync wirelessly and connect with friends and family and you've got a powerhouse of recorded, searchable, and shareable data.

Netflix
Streaming TV and movies is a complicated process. The Netflix app accomplishes this pretty seamlessly and includes the ability to predict content you'll enjoy, separated for up to 5 different profiles, in a multitude of languages.

Amex
Security is the top concern when you're dealing with banking, payment and financial apps. The AmEx Mobile app includes enhanced security features and fraud alerts as well as the ability to track spending and rewards, find offers, and pay your bill.

$1M+

These apps have tons of hidden features and are not as simple as you assume from a functional standpoint.

Home Depot App
Take the best of omni-channel (search, BOPIS, product reviews) and add GPS enabled in-store mapping with store specific menus, visual item look up features and voice search and The Home Depot app stands out as a best in show retail mobile app.

Delta App
The recently redesigned Delta app includes quick access to important day-of-travel information, a host of mobile payment features for booking flights (choosing/changing seats, the ability to pay for and track baggage), and complex navigation tools (parking and airport maps, gate and baggage carousel information).

Google Maps
Your default navigation tool includes comprehensive, accurate maps in 220 countries and territories with real time traffic conditions, automatic re-routing and transit option information, reviews, ratings and indoor images and mapping for local businesses and restaurants for over 100 million places in 15,000 cities. Now integrated with ride services (Uber, 99Taxis, Ola Cabs, Hailo, MyTaxi and Getty).

BRETT COOPER is the Founding Partner at BlueFletch. He specializes in strategy, infrastructure, project management, security, and enterprise system implementation.

621 North Avenue NE | Suite A-150 | Atlanta, GA 30308 |
phone 855 529 6349 | *email* info@bluefletch.com

We build mobile solutions for Mobile Applications, Location-Based Services, Mobile Analytics, Payment Technologies, Sensors, and Wearables.

blueletch.com