

# IBM Enterprise Content Management Mobile Application Implementation

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ECM





International Technical Support Organization

**IBM Enterprise Content Management Mobile  
Application Implementation**

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**Note:** Before using this information and the product it supports, read the information in “Notices” on page v.

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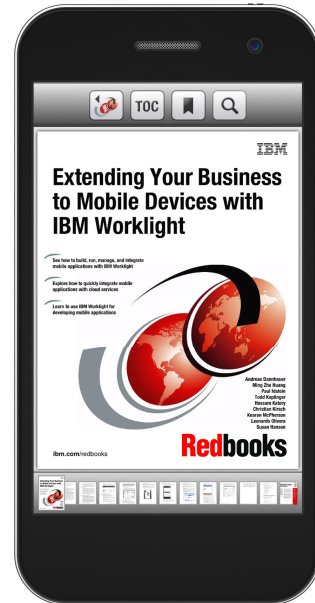
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# Preface

IBM® Enterprise Content Management (ECM) software enables the world's top companies to make better decisions, faster. By controlling content, companies can use industry-specific solutions to capture, manage, and share information. Successful organizations understand that business content matters more than ever as mobile, social, and cloud technologies transform their business models.

This IBM Redpaper™ publication introduces the mobile functionality offered in IBM Enterprise Content Management products: IBM Content Navigator, IBM Case manager, and IBM Datacap Mobile.

This paper covers key security considerations for mobile application deployments. Many organizations are concerned about the usage of mobile devices for business use and the risk to enterprise data leakage. Mobile technology and mobile security practices have evolved to provide enterprises with all the tools they need to properly secure and manage mobile deployments. As with any best practices or tools, organizations must adopt and implement them for mobile solutions and mobile security to be effective.

This paper provides the reader with a deeper look into each one of the IBM ECM mobile offerings and a full description of their current capabilities; using an end-to-end sample scenario covers a commercial real estate loan process.

This paper is intended for both executives and technical staffs who are interested in obtaining a quick understanding of the mobile capabilities offered in the IBM Content Management portfolio and the application development functionality.

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# IBM Enterprise Content Management and mobile overview

IBM Enterprise Content Management (ECM) software enables the world's top companies to make better decisions, faster. By controlling content, companies can use industry-specific solutions to capture, manage, and share information. Successful organizations understand that business content matters more than ever as mobile, social, and cloud technologies transform their business models.

This paper introduces the mobile functionality offered in IBM Enterprise Content Management products: IBM Content Navigator, IBM Case manager, and IBM Datacap Mobile.

This paper also covers key security considerations for mobile application deployments. Many organizations are concerned about the usage of mobile devices for business use and the risk of enterprise data leakage. Mobile technology and mobile security practices have evolved to provide enterprises with all the tools they need to properly secure and manage mobile deployments. As with any best practices or tools, organizations must adopt and implement them for mobile solutions and mobile security to be effective.

The paper then offers a deeper look into each one of the IBM ECM mobile offerings and a full description of their current capabilities using an end-to-end sample scenario covers a commercial real estate loan process.

In this chapter, we provide an overview of IBM ECM Mobile offerings and the strategy.

## 1.1 ECM industry overview

Enterprise Content Management (ECM) is a broad term that has evolved over many years to now encompass every method, technique, technology, and strategy used to manage business content. Business content today includes many varieties of content, such as collaborative content, social content, content produced by office applications, reporting tools, email, and many other forms of content.

Enterprise Content Management technology applications often include at a minimum a content repository system (such as IBM FileNet Content Manager and IBM Content Manager), where files can be stored, secured, indexed, searched, deleted as necessary, and versioned; additional business applications on top of the primary content repository are often applied to help the lines of business solve specific business problems, such as these:

- ▶ A case management application, such as IBM Case Manager, used to solve a vast number of business problems with automated tasking capabilities that connect content with business processes.
- ▶ A document imaging application, such as IBM Datacap, that can convert paper documents to electronic documents then index and store them in the content repository.
- ▶ Information lifecycle governance solutions that include records management, content archiving and e-discovery capabilities like those offered by the IBM Information Lifecycle Governance portfolio.
- ▶ Analytics applications, such as IBM Watson™ Content Analytics, used to derive insight from massive amounts of content and help businesses make better decisions, faster.
- ▶ Reports management systems, such as IBM Content Manager OnDemand, that are massively scalable and can store, retrieve, search, index and manage.

In IBM, when we talk about ECM, we mostly focus specifically on how IBM helps organizations manage unstructured and semi-structured information through software tools, best practices, processes, and professional services. There are other technologies and practices that focus on structured information management, such as databases; although IBM does have solutions to address this type of information, these are not covered in this paper. Interested readers can search for IBM InfoSphere® Optim™ Data Lifecycle Management solutions.

## 1.2 IBM ECM Mobile overview and strategy

In the industry today, *app* is a shortening of the term *application software*. It is the de facto standard term used to describe mobile software. The word became popular after the 2008 release of the iTunes App Store, Apple's purchasing and installation mechanism for iOS. Google followed shortly after by the Google Play Store.

Mobile apps have an implied simplicity due to the constraints of mobile devices, namely reduced screen real estate, limited battery life, constrained input methods, and unreliable connectivity.

To be successful, mobile apps must aid the normal mobile device user ("normobs") in dealing with mobile device constraints. This focus on user experience (UX) gave way to a revolution in software design. Normal mobile users care more about convenience and ease of use than checklists of software features.



The mobile strategy for IBM ECM is threefold:

- ▶ First, the strategy is to provide apps for the key offerings that fully complement the core solutions. For example, IBM provides a Case Manager Mobile application that works in tandem with the IBM Case Manager product and complements the desktop experience. It does not replace the desktop experience. It is similar to how business people use email today: we have a desktop where we can sit and write complicated emails, attach documents and do that with great ease when we are at our desk. However, we can also be mobile and read email, monitor for important emails we are expecting, and even respond to email if necessary. This requires that our mobile apps be highly targeted and the UX be specially focused on the intended use of the app. For example, if it is a Case Management app, then the app should be totally focused on that function and we should not cram other non-case management-related functionality into the app.
- ▶ Second, the IBM ECM mobile strategy requires that IBM deliver the best possible mobile experience for the normobs and this usually translates into delivering fully native applications for the most relevant mobile operating systems, which today are iOS and Android. This way, iOS or Android normobs will easily adapt to any of the IBM ECM mobile apps, because the controls will feel second-nature to them and the adoption of the app will be frictionless.
- ▶ Third, the strategy calls for delivery of reusable and extensible libraries that customers, business partners, and any mobile developer can use to easily integrate the IBM ECM mobile functionality into their own custom applications. Delivering this type of value is key for offerings where IBM customers have requirements to produce bespoke mobile apps.

IBM ECM has three mobile offerings that complement the key parts of the ECM portfolio:

- ▶ *IBM Navigator Mobile*: The UX for this app is primarily around providing users easy access to their content that is stored in the FileNet Content Management system. This app is currently available for iOS. It includes the ability to browse, view, search, retrieve, add, delete, and edit content that is stored in the repository. This app also provides the ability to view and add comments to documents, participate in Teamspace, and offline access to documents. This app integrates with IBM Content Navigator.
- ▶ *IBM Case Manager Mobile*: The UX for this app is primarily focused around the Case Manager case worker who needs to have access to case information while on the road and needs to be able to update and complete tasks. Much of the functionality in this app is centered around case work task execution and it includes mapping capabilities so that case workers can see where their tasks lie on the map relative to their current position. This app integrates with the IBM Case Manager server and any solution designed in IBM Case Manager can be leveraged by this mobile app.
- ▶ *IBM Datacap Mobile*: The UX for this app is primarily centered around capturing or imaging documents using mobile devices. This app includes advanced imaging capabilities, such as automatic edge detection, auto capturing of images, the ability to add metadata to documents for easier indexing, on-device object character recognition (the ability to auto ready text), on-device barcode decoding (to populate data fields automatically), and it integrates with the IBM Datacap server. Any solution defined in IBM Datacap can be leveraged by the mobile app.

A worthwhile note is that the current state of these apps is not their final state. IBM continues to enhance these apps and continues to revisit the UX to make them easier to use and deliver more value to IBM customers.





## Securing mobile applications

Mobile apps are capable of significantly increasing many aspects of enterprise productivity, including enablement of knowledge workers by informing key decisions in a timely manner, or providing optimized data capture. To perform these functions, the mobile device must access environments and datasets that carry various levels of proprietary, confidential or personal information.

Mobile knowledge workers are most efficient when in the field, meaning that enterprises are unable to provide extended physical security for mobile devices, which is something that is implicit for desktop or server computers located on premises. This lack of control also extends to the network infrastructure the mobile device uses. Enterprise data will inevitably travel over insecure networks outside the corporate sphere of control. Digital security is therefore an elevated concern when developing, distributing, and maintaining mobile apps.

Mobile devices are inherently challenged by unreliable network connections and limited battery life. To address these issues and provide reliable user experience, app developers store data locally on the device so that it can be accessed when offline, or processed later when connectivity or power are restored. These properties result in an environment on which a device misplaced or attacked outside of the enterprise might contain permutations of a user's enterprise credentials, valuable corporate information, or personal data.

Further, with the bring your own device (BYOD) trend gathering in popularity, the enterprise does not control in its entirety the contents of a user's device.

Finally, as the smartphone becomes an integral part of our daily lives as consumers, and as the enterprise further leverages mobile, malware attacks on mobile devices are accelerating.

This chapter discusses the security for mobile devices and applications. We cover the following topics:

- ▶ Built-in security measures of mobile platforms
- ▶ Mobile device management (MDM)
- ▶ Mobile application management (MAM)
- ▶ More reading

## 2.1 Built-in security measures of mobile platforms

Mobile platforms include built-in security mechanisms to counter these threats. A number of these techniques are common to the most popular operating systems, iOS and Android.

Modern smartphone platforms are designed with the expectation that attackers will try to gain access. Platforms attempt to reduce the impact of possible attacks by employing the security features in the following categories:

- ▶ System security
- ▶ App security
- ▶ Data encryption
- ▶ Network security
- ▶ Mobile Device Management

These functions are used in a layered approach, often referred to as “The Onion Model” (peeling back one layer reveals another), to mitigate vulnerabilities and minimise the impact of successful attacks.

### 2.1.1 System security

The foundation of the modern smartphone platform is system level security.

On system startup, bootloader security is validated. This ensures that the operating system is not compromised when loaded. iOS devices “boot” from read-only memory installed and signed during manufacture. Android devices are usually shipped with locked bootloaders, although manufacturers provide instructions on how to unlock the bootloader, opening up a possible attack vector.

Modern smartphone operating systems are regularly updated, both to address security vulnerabilities, and provide new features to device users. Preventing a downgrade of the operating system on a device is desirable. If an attacker gains access, the attacker can downgrade the operating system and take advantage of previously mitigated vulnerabilities.

The majority of iOS updates are installed over the air (OTA). Updates are signed and verified upon installation, and update ratios are high compared to the industry average.

Despite regular updates to the Android operating system, update ratios are below those of iOS for four reasons:

- ▶ Android manufacturers must upgrade device level drivers to be compatible with the latest version of software.
- ▶ Android device hardware might not be powerful enough to run new versions of the operating system (this is true for iOS, but the sheer number of Android devices, combined with their cheaper average pricing make this point salient).
- ▶ Android manufacturers often provide a customized version of the operating system (for example, Samsung have TouchWiz), which might need to be modified to support core Android updates.
- ▶ Cell phone carriers can block Android updates to encourage users to upgrade to the latest device.

The “Secure Enclave” coprocessor, included with recent iOS devices, has interesting security properties. It runs on dedicated hardware with a secure boot process to isolate itself from the rest of the device’s software, and provides the storage for the Touch ID feature. Touch ID forms the basis for improved user authentication, device unlock, and Apple Pay. From iOS9,

third-party apps are also able to use cryptographic operations with the Secure Enclave. For example, one could write a private key into the Secure Enclave. The Secure Enclave then provides a facility for signing data, and the private key need not (and indeed cannot) be read again by the main operating system.

After the device is booted, the user of a smartphone should be required to unlock the device.

iOS offers four locking methods:

- ▶ Simple Passcode (4 digits)
- ▶ Extended Simple Passcode (6 digits)
- ▶ Complex Passcode (alphanumeric, unlimited characters)
- ▶ Touch ID with Passcode fallback

A simple passcode has 10,000 combinations, an extended simple passcode has one million. Complex passcode combinations increase exponentially with every extra character.

Fingerprints have a 1 in 50,000 chance of a random match. To mitigate this risk, users are required to enter a passcode if they fail to authenticate with Touch ID five times. Touch ID's ability to unlock the device is also removed every 48 hours, when the device restarts or receives a remote lock command, requiring passcode entry before it is reinstated. The major benefit of Touch ID is that its convenience as a replacement for regular passcode entry encourages smartphone users to set longer passcode than they would have otherwise, improving data protection security.

Data marked as protected on the iOS file system will be encrypted by using the user's passcode as a seed for the cryptographic algorithm.

Android offers three locking methods:

- ▶ PIN (a 4 - 17 digit numeric code)
- ▶ Password (a 4 - 17 alphanumeric password with at least one letter)
- ▶ Pattern (a drawn unlock pattern)

Android manufacturers might also offer model specific unlock methods such as Face Unlock or fingerprint scanners.

Android has supported encryption for user data since Android 3.0 using a just-in-time process that automatically encrypts and decrypts data as it is written to or read from disk. The user's passcode is used to create an encryption key for user data. Android 5.0 introduces full disk encryption (FDE) as a default on Google's reference Nexus devices. FDE is a kernel extension enabling encryption for external storage and internal storage. It also introduces further resilience against brute force attacks.

## 2.1.2 App security

The first line of defense of modern smartphone platforms for third-party code is the application sandbox and process model, isolating app data and execution.

On iOS, all code is required to be signed by an Apple issued certificate. This can be either an ad hoc developer certificate (with limited device installations, 200 currently), an enterprise certificate (limited to devices used by employees of a company), or an App Store certificate (no limit). App Store certification requires manual review by a member of Apple App Store review team.

Android devices can install apps through the Google Play Store, or other stores (notably the Amazon Appstore). Android also allows “sideloading” of apps without limitation if the device user allows this in their device settings.

Platforms implement “app sandboxing” by default, meaning that apps are prevented from accessing data or resources stored by other apps and system files.

By default, apps run in the foreground only with no access to data outside of the sandbox or sensor information. Apps might not escalate their own privileges.

However, apps commonly require a heightened profile, for example, running in the background with access to GPS location information for an automotive navigation app. In this case, the operating system requires explicit declaration of requirements from the app to the operating system. The operating system might then choose to prompt the user for approval. This means that a decision to share data between apps or access potentially confidential information must be explicit from both the app and the user, and is fully brokered by the operating system.

On iOS, the list of granted permissions is available to the user through the preinstalled Settings app. Android provides similar functionality using the Permissions Manager. Through these supervision methods, users can revoke previously granted access if they suspect apps of misuse. A common example is turning off location access to conserve device battery life.

System integrity can be considered compromised if administrative access to the device is achieved by “jailbreaking” (iOS) or “rooting” (Android). When this operation is performed, system-level access can be assigned to applications, invalidating sandboxing and permission brokerage among other security layers.

### 2.1.3 Data encryption

Both iOS and Android operating systems provide full cryptographic modules to third-party apps.

iOS apps provide a set of straightforward encryption classes, in particular these classes:

- ▶ None (data is not encrypted)
- ▶ Until First Authentication (data is encrypted until the first time the user authenticates until reboot)
- ▶ NSFileProtectionComplete (data is always encrypted when the device is locked)

App data including databases or resource files can be assigned an encryption class, which is implemented and enforced by the operating system. Apps can also implement their own custom encryption using built-in or third-party cryptographic libraries.

iOS also provides the Keychain, a dedicated database for secure information. Access to the Keychain is through a separate daemon process running outside of the app’s sandbox to prevent apps from attempting to break into it.

The cryptographic modules in iOS are undergoing validation for US Federal Information Processing Standards (FIPS) 140-2 Level 1.

Android apps can rely on the operating system’s provision of Full Disk Encryption, or provide their own encryption methods using built-in cryptographic libraries, or third-party libraries. Android provides the KeyChain (which has different functionality from the iOS Keychain), a method to store and share credentials between apps, and the Keystore. The Keystore is used

to store private keys which can then be used to sign information. The Keystore provides methods to ensure that the users have been authenticated by unlocking their device before it is accessed.

## 2.1.4 Network security

Network security is an important facet in provision of a secure mobile environment.

The networks that a mobile device use should be considered implicitly insecure. For example, a BYOD smartphone might connect to a home network over a WiFi router that has a factory default password, then change to a 3G network provided through a consumer-purchased SIM card, and finally use a shared connection in a coffee shop. None of these network infrastructures is owned or operated by the enterprise that is responsible for the data transmitted.

In addition, data access is a common requirement, if not the primary requirement, for most enterprise mobile apps.

Both iOS and Android platforms support Transport Layer Security (TLS, which postdates SSL). TLS creates a secure, bidirectional tunnel for data interchange. The primary means of networking with TLS is HyperText Transport Protocol - Secure (HTTPS). We suggest that all mobile apps use HTTPS.

TLS uses public key infrastructure to ensure that participating parties can be reliably identified. However, it has a particular vulnerability to man-in-the-middle attacks in which attackers pose as a trusted party by infiltrating the chain of certificate trust. A popular mitigation is app level certificate pinning in which the app re-verifies the chain of trust against a narrow set of acceptable choices.

Both iOS and Android platforms also support Virtual Private Networks (VPNs). This is a commonly used technology to allow remote devices to connect to a company intranet. The device can then take advantage of the network policies of the intranet (for example, filtering, monitoring). VPNs require authentication, but this can be stored (that is, password, key, or certificate) so as to require no intervention from the user when a connection is required.

The platforms offer different VPN configurations including these:

- ▶ VPN on demand (iOS only: the VPN starts when any app connects to a specified domain)
- ▶ Per App VPN (iOS only: a separate connection can be specified for each managed app)
- ▶ Always on VPN (the VPN connection is always used)

## 2.2 Mobile device management (MDM)

MDM products contain a set of functionality for remotely securing devices.

A number of products provide server-based configuration tools (for example, IBM MobileFirst™ Protect, Airwatch, Good for Enterprise) for device management policies. These often include client-side apps, that provide extra functionality, for example, an Enterprise App Store.

These tools allow administrators to configure and send policies to the device, query the device, install and remove apps, and lock and wipe devices.

The iOS platform provides built-in functionality for receiving and applying device management policies.

Common examples of policies include passcode enforcement, app installation policies, policies relating to backup, and other device behavior, for example, enable and disable camera usage. MDM can also query devices for information, for example, enumerating installed applications and checking the operating system version.

iOS does not require a client side app to apply policies, these are implemented by the operating system.

The operating system maintains a list of “managed” apps and accounts. MDM can restrict sharing of data between managed and unmanaged resources, for example, disallowing “Open In” ability from a managed notes app that might contain proprietary information to a user’s social networking app. This would be common in a bring your own device (BYOD) scenario.

MDM can also be used to manage and revoke VPN connections. This is a particularly useful functionality, effectively allowing remote configuration of networking to ensure security.

MDM systems might not query unmanaged resources, for example, apps downloaded from the consumer app store.

The Android platform provides the Device Administration API, and an extra client-side app is required to apply these policies. This should be provided by the MDM vendor.

Android policies are similar, although less extensive to those provided by iOS, for example, passcode enforcement, encryption requirement, camera disablement.

The Android MDM vendor app often provides app installation and removal as further functionality, but this is vendor specific.

## 2.3 Mobile application management (MAM)

Further to mobile device management, individual mobile apps must behave in a secure manner.

Common examples of secure engineering include ensuring that these actions are met:

- ▶ All data is encrypted when the device is locked.
- ▶ Where possible, passwords or other sensitive data are not persisted on the device.
- ▶ Networking is performed over secure connections.

The three ways to ensure that apps are built in a secure manner are as follows:

- ▶ MDM + secure coding: The developer leverages functionality provided by the platform and secure coding practices.
- ▶ MAM SDK integration: The developer integrates a MAM SDK from a third-party vendor to use the vendor’s secure container.
- ▶ MAM app wrapping: the company deploying the app wraps the app provided by the developer.



Each approach has advantages and disadvantages:

- ▶ The first relies on the developer's ability to create a secure product, and the base operating system.
- ▶ The second approach requires deep integration with a third-party SDK. This has the result of "locking in" the development to the selected MAM vendor.
- ▶ The third approach injects new libraries into a pre-existing binary. In theory, this should require no change from the developer, but in practice, the developer is required to conform to a set of guidelines. App wrapping is also a legal gray area that might invalidate developer software warranties.
- ▶ One distinct advantage of the MAM approach is that policies can be controlled remotely. If a particular security flaw is uncovered, policies can be updated to reflect or reduce vulnerabilities.

However, MAM approaches require third-party vendors to update their libraries or tools each time a platform update occurs. This makes supporting new versions of a platform difficult for developers, because they must wait for the MAM vendor to release an update to their library.


Each approach should be combined with penetration testing to ensure the minimum chance of attack through secure coding weaknesses.

## 2.4 More reading

For more information about mobile security, see the following documents:

- ▶ iOS Security  
[http://images.apple.com/business/docs/iOS\\_Security\\_Guide.pdf](http://images.apple.com/business/docs/iOS_Security_Guide.pdf)
- ▶ iOS Deployment Overview for Enterprise  
[http://images.apple.com/business/docs/iOS\\_Enterprise\\_Deployment\\_Overview.pdf](http://images.apple.com/business/docs/iOS_Enterprise_Deployment_Overview.pdf)
- ▶ Android Device Administration Framework  
<http://developer.android.com/guide/topics/admin/device-admin.html>





## ECM Mobile apps architecture and deployment

This chapter outlines three ECM Mobile apps, their architectural composition, and how they can be deployed and customized in IBM ECM environments. Three applications are detailed:

- ▶ IBM Navigator Mobile
- ▶ IBM Case Manager Mobile
- ▶ IBM Datacap Mobile

## 3.1 Sample scenario

To assist in the understanding of how the mobile applications function, a sample business scenario is constructed that is used throughout this paper. This scenario is designed to highlight the key features and functions of the ECM Mobile Applications. We outline the high level scenario and then highlight the individual usage in each of the subsequent sections.

The sample scenario covers a commercial real estate loan process. This process begins when a customer contacts their financial institution to request an appointment to apply for a loan. In today's market, an important aspect is that companies maintain a high touch point interface with their critical clients. In these cases, institutions might commonly provide a Relationship Manager that will interact directly with the client.

The Relationship Manager will schedule an appointment with the client to process the application and collect the required paperwork. To save time and effort for the client, the Relationship Manager will meet with them at the client site. While onsite, the Relationship Manager can assist the client in completing all of the necessary paperwork, sign documents, and collect any other supporting documentation.

IBM Navigator Mobile enables the Relationship Manager to display a portfolio of real estate loan products and send to the customer selected brochures in an email. The available product material can be centrally controlled and distributed to Relationship Managers on a group basis. This material is also available offline, to support the Relationship Managers whether or not they have access to a network.

Datacap Mobile enables the Relationship Managers to collect and capture those documents while they are at the client site. The paper documents can be captured and indexed while the Relationship Manager is onsite, making the Relationship Manager instantly available in the content repository. In the past, the Relationship Manager had to collect the documents, take them back to the home office, and scan them. This often resulted in a significant delay because all of the documents for the day were not captured until the end of the day. With Datacap Mobile, the documentation is available before the Relationship Manager leaves the client site.

When the documents arrive in the repository, content events are triggered to create the necessary cases and file the arriving documents into the appropriate case. The Loan case is created when the Application is received. The creation of the case on Application arrival allows processing of the case and tasks to begin immediately. The Underwriter is able to begin processing the loan and evaluating the application. In the course of reviewing the loan application for the purchase of an existing commercial property, it is determined that an inspection of the property is required. This results in the creation of a task for Property Inspection.

The Property Inspection task is assigned to a property inspector who is tasked with visiting the property to take photos and generate an investigation report. The completion of these activities is necessary to be able to successfully underwrite the loan. Property Inspectors are field operatives who are rarely in a home office. Their day is spent travelling from location to location to complete the property investigations that they have been assigned. In today's environment, the inspector goes from site to site collecting information. When the inspector returns to the office, the inspector uploads these photos into the case management system. This means that at the end of each day, the tasks are completed and the next day the Underwriter can continue his or her work.

The Case Manager Mobile app changes that. Now, when an inspector gathers the necessary information, the information will be immediately reported to the Underwriter as soon as it is

completed. By opening the Case Manager app, the inspector can look at the details of the task. The Property Inspector can complete data entry and immediately add photos or other documents to the case and complete their task. The next steps of the process can start before the Inspector leaves for the next site.

The IBM Case Manage Mobile app provides a mapping function that allows users to see the locations of the tasks that they have been assigned based on their current location rather than through data that is unrelated to the closest sites. As a field worker, the Property Inspector is on the road and is best served by being able to determine where the nearest tasks are to most efficiently complete work. Hours can be saved by completing work that is based on location, rather than making guesses or trying to look up addresses. This adds a new element to workload management increasing the Inspector's effectiveness. Now the Property Inspector can open the Case Manager app and see inspections that are close to where the inspector is, reducing the travel (down) time between jobs.

This scenario provides one example of how mobile can impact a business process and is designed to be a single example. Similar activities take place in several different industries supporting many different processes.

## 3.2 IBM Navigator Mobile

This section covers an overview of both IBM Content Navigator and IBM Navigator Mobile, and discusses the architecture, deployment, configuration, and customization. This section includes the following topics:

- ▶ IBM Content Navigator overview
- ▶ IBM Navigator Mobile overview and architecture
- ▶ IBM Navigator Mobile deployment
- ▶ IBM Navigator Mobile customization

### 3.2.1 IBM Content Navigator overview

IBM Content Navigator provides a unified Enterprise Content Management (ECM) application experience to deliver value and an intelligent, business-centric experience. Administrators can configure the IBM Content Navigator user interface to provide a tailored user experience to meet one or more business requirements, without the need of custom code. If the ready-for-use experience is not sufficient, IBM Content Navigator also provides a robust development platform to build a user interface to solve customized business requirements.

#### IBM Content Navigator terms

Some terms have specific meaning to IBM Content Navigator:

- ▶ *Repository*: In this paper, a repository is a document management system that IBM Content Navigator connects to. It can include IBM FileNet Content Foundation, IBM Content Manager, IBM Content Manager OnDemand, or third-party document management systems that implement Content Management Interoperability Standard (CMIS).

**Note:** Some IBM ECM mobile applications might support only a limited quantity or type of repository.

- ▶ *Desktop*: An IBM Content Navigator desktop represents a tailored view of the available repositories and the functionality that IBM Content Navigator can provide. The desktop is

one instance of the IBM Content Navigator application within the Content Navigator deployment, for which you can configure a different appearance, different available functionality, and different repositories that will be available and visible within the user experience. An administrator can configure multiple desktops to solve the various needs of multiple business roles or departments.

- ▶ *Teamspace*: An IBM Content Navigator teamspace provides a targeted view of documents, folders, and searches that a group of users needs to complete its work tasks. IBM Content Navigator administrators can allow users to dynamically provision preconfigured teamspace from the IBM Content Navigator web client.
- ▶ *Plug-in*: An IBM Content Navigator plug-in extends the capabilities of IBM Content Navigator without modifying the code of the IBM Content Navigator server. Separating server code from customizations allows developers to provide new features without impeding an administrator from updating or patching the IBM Content Navigator server.

**Note:** Some ECM mobile applications require a plug-in.

- ▶ *External Data Service*: An IBM Content Navigator administrator can implement an External Data Service (EDS) plug-in to customize specific actions during the IBM Content Navigator client experience. Examples include setting minimum and maximum property values, property validation and error checking, and dynamic choice lists.

### 3.2.2 IBM Navigator Mobile overview and architecture

The IBM Navigator Mobile application is one of the three publicly available mobile applications discussed in this document. These ECM mobile applications are complementary to the web ECM experience. In the case of the IBM Navigator Mobile application, it is complementary to the IBM Content Navigator web client experience by extending a subset of Content Navigator capabilities to users on mobile devices.

As of September 2015, the IBM Navigator Mobile application is available on iOS and supports both iPhone and iPad form factors. The application supports create, read, update, and delete (CRUD) access to content.

#### IBM Navigator Mobile architecture

The IBM Navigator Mobile client accesses the IBM Content Navigator back end through the IBMECMCore iOS SDK which provides a strongly-typed implementation of the back-end model layer. Because the libraries are written in Swift, it supports Xcode applications written in either ObjectiveC or Swift.

Figure 3-1 on page 17 shows the components of the IBM Navigator Mobile architecture.

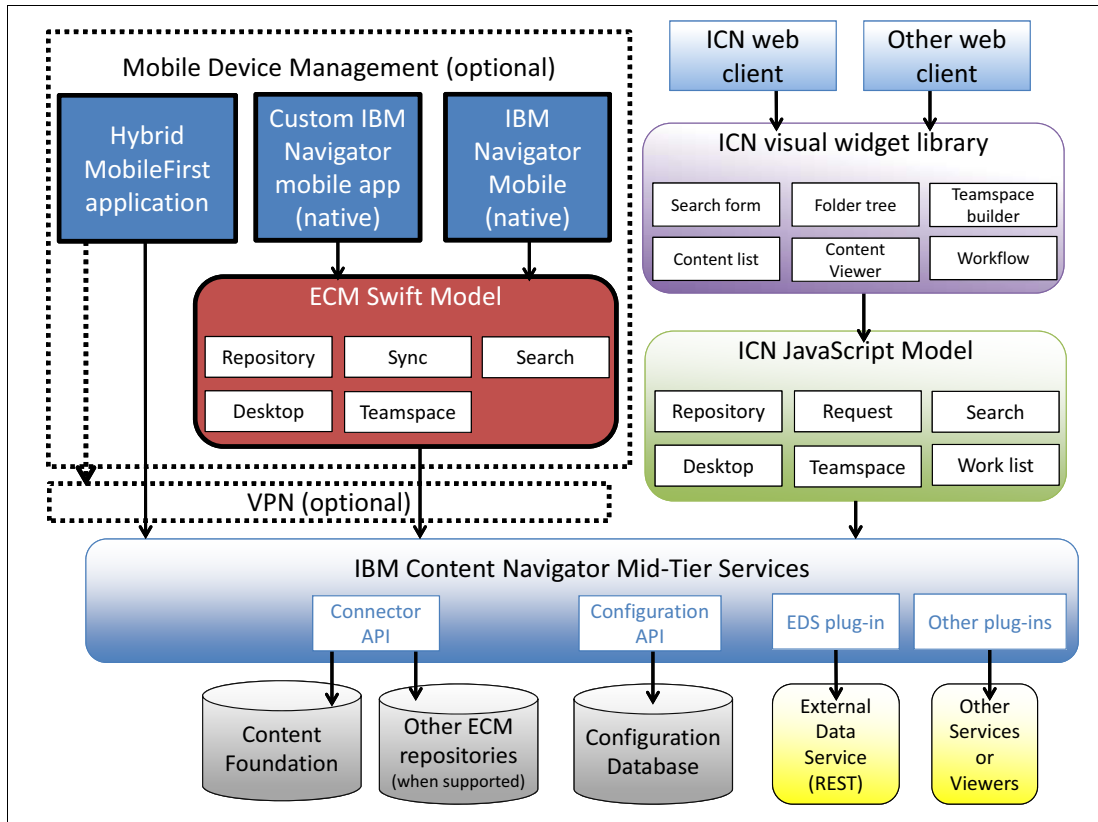


Figure 3-1 IBM Navigator Mobile Architecture

For those experienced with the IBM Content Navigator web client, the architecture should be familiar. The primary additions are the mobile client and optional components for mobile device management.

IBM Navigator Mobile is a native iOS application in the Apple App Store and uses the Swift ECM model to access core document services in the ECM repository. Custom applications can use the IBM Navigator Mobile SDK to access these services.

**Note:** The IBM Datacap Mobile and IBM Case Manager Mobile clients use different iOS model libraries and SDKs.

The September 2015 release (1.0.1.1) of the IBM Navigator Mobile client supports integration with IBM MaaS360® for mobile device management. This supports on-device containerization and mobile VPN connections to the ECM repository. The diagram does not show the remote administration server for mobile device management server. For more details about mobile device management, see Chapter 2, “Securing mobile applications” on page 5.

The September 2015 release of the IBM Navigator Mobile application currently supports the IBM Content Foundation ECM repository. Look for additional ECM repository support as newer versions of this app are released.

## Application features

The IBM Navigator Mobile application supports ECM document capabilities for a single IBM Content Navigator desktop. Mobile users can browse the folder tree exposed by the desktop, browse favorite documents, and search for file names in context of a specific folder. The application also supports adding or renaming folders.

**Note:** ECM-wide searches and saved searches are not currently supported.

Users can add photos to a folder or move documents to a new folder. Users can also use the Add File option (Figure 3-2) to add files from the iOS Document Provider from other applications or services, like iCloud or Box, using the iOS document picker. Users no longer have to switch to the other application and select **Open in** to add a document to Navigator Mobile.

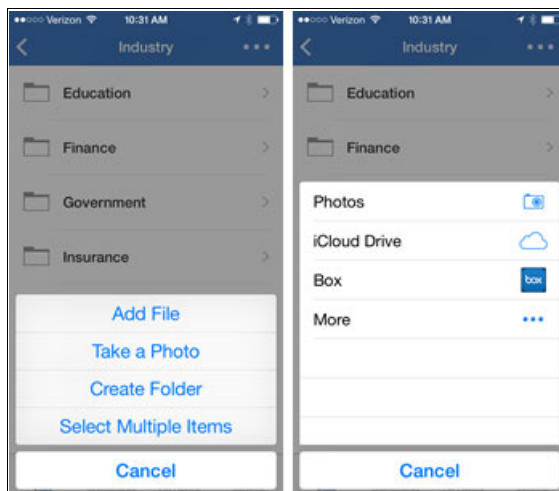


Figure 3-2 IBM Navigator Mobile support to Add File from iOS document providers

The IBM Navigator Mobile application supports the iOS document provider extension, so other iOS applications, like Apple Pages or Microsoft Word, can also use the document picker to add documents from IBM Navigator Mobile. Figure 3-3 shows an example.

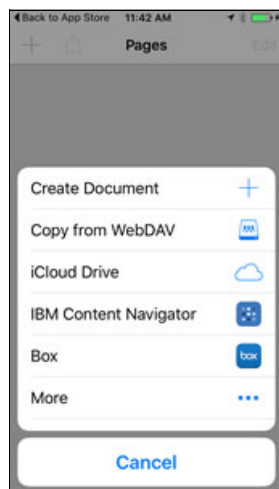


Figure 3-3 Apple Pages opening document from IBM Navigator Mobile



**Note:** Administrators can configure their mobile device management solution to restrict access to the document providers of some mobile applications.

Mobile users can mark and find frequently used documents by using the IBM Content Navigator favorites. The application even supports selecting multiple items for operations, such as moving three documents to a different folder. The mobile application supports viewing and editing the properties of a document or folder.

Users can also select documents to be available offline. When selected, the application synchronizes the documents in the background and stores the documents on the iOS device in the data container for the IBM Navigator Mobile application. Users can view and edit the document while offline. When a network connection is available, the application re-synchronizes any revised documents to the ECM server as a new version of the document. Figure 3-4 shows a sample view of the On Device content.

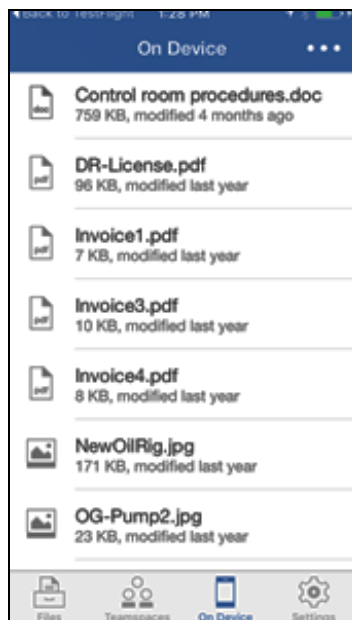


Figure 3-4 On Device storage of sync content

## ECM security

Like the IBM Content Navigator web application, the IBM Navigator Mobile application fully supports the ECM security model without additional configuration or setup. For example, if an IBM Content Navigator web user cannot edit a property on a document, the IBM Navigator Mobile user is also unable to edit the property on a document.

**Benefit:** This complementary approach to mobile applications reduces the time needed to deploy ECM mobile clients.

### 3.2.3 IBM Navigator Mobile deployment

The IBM Navigator Mobile iOS application is available at the Apple App Store for no additional charge. Users can download the app and manually configure the user and password.

#### Server requirements

The September 2015 version of the IBM Navigator Mobile application requires an IBM Content Navigator server with version 2.0.3.5 or newer. No IBM Content Navigator plug-in is required for the IBM Navigator Mobile application. This release of IBM Navigator Mobile also supports IBM Content Foundation repositories, at whatever level is required by IBM Content Navigator 2.0.3.5.

Watch the app store page or the following IBM ECM Mobile external forum as newer app releases are made available:

<https://ibm.biz/BdFhvd>

#### Device requirements

The September 2015 version of the IBM Navigator Mobile application requires an iPhone or iPad running iOS version 8.4 or newer. The iPhone app currently runs in portrait mode only while the iPad app supports both portrait and landscape modes.

#### MDM configuration

As explained in Chapter 2, “Securing mobile applications” on page 5, mobile device management solutions can support a basic set of app distribution and containerization without direct integration with a mobile app. Additional Mobile Device Management (MDM) features are available when the native app includes integration for a specific MDM vendor or when the application is redistributed after being wrapped or customized.

The IBM Navigator Mobile app currently supports IBM MaaS360 MDM, using the MaaS360 WorkPlace SDK v2.91. In addition to security and containerization features, mobile administrators can also use MaaS360 to preconfigure the mobile app by pushing the User ID and Navigator Server URL configuration into the IBM Navigator Mobile app. Eliminating the manual entry makes mobile deployment simpler.

To distribute a configuration with MaaS360, first create a JSON file with your configuration values. Example 3-1 shows a sample configuration file.

*Example 3-1 Sample configuration file*

---

```
{
  "version":1.0,
  "url":"https://yourserverhostname/navigator/",
  "username":"%username%",
}
```

---

Next, edit the Workplace Persona policy, enable the container, upload your configuration file, and publish the updated policy. For more details about how to configure the app with MaaS360, see the IBM Knowledge Center for Content Navigator:

<http://www.ibm.com/support/docview.wss?uid=swg27041953>

### 3.2.4 IBM Navigator Mobile customization

Unlike the IBM Case Manager and IBM Datacap mobile applications, the September 2015 release of IBM Navigator Mobile does not yet support branding and theming. The IBM Navigator Mobile SDK is currently available for iOS and can be used to develop applications with a custom brand or theme.

#### IBM Navigator Mobile iOS SDK

The iOS SDK includes the libraries required to create a custom Content Navigator mobile application, and also includes a sample mobile application written in Swift. Although the sample is not a robust application, programmers can find more help to expand this sample in *Customizing and Extending IBM Content Navigator*, SG24-8055 or see the next section “Custom Navigator application example” for a sample.

**Note:** The IBM Navigator Mobile iOS SDK requires a MacOS computer, Xcode, and CocoaPods as a dependency manager to build the sample. The version of Swift in Xcode 7.0 differs from 6.4, so we currently suggest using Xcode 6.4 to compile the sample. iOS 8.4 or newer is required on the mobile device.

#### Custom Navigator application example

For this paper, we developed an iPad application with the Navigator SDK. This application enables customer-facing sales employees to present and email product brochures and account documents to a customer.

The application uses IBM Content Navigator as the source of the brochures and pictures. Adding new brochure documents to the app is as easy as adding documents to the repository with IBM Content Navigator. No code changes need to be made to add new documents or images. The app also uses teamspaces to provision brochures to a subset of the sales staff.

The application is written in Swift. Figure 3-5 shows the Navigator product Sales application example.

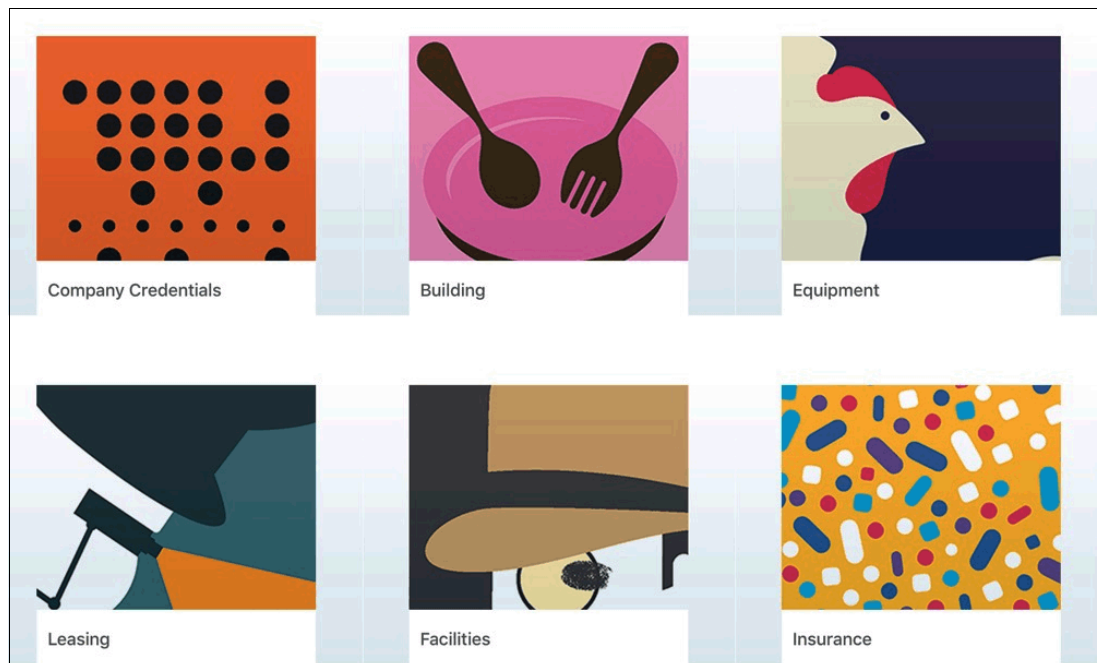


Figure 3-5 Product Sales application example

## 3.3 IBM Case Manager Mobile

This section covers the concept of case management as it applies to IBM Case Manager and how mobile applications can be used to extend the impact of case manager on your business. The relationship between mobile processing and case manager is explored, including the architecture, deployment, and customization of IBM Case Manager Mobile.

This section includes the following topics:

- ▶ Case Manager overview
- ▶ Case Manager Mobile architecture
- ▶ Case Manager Mobile deployment
- ▶ Case Manager Mobile customization

### 3.3.1 Case Manager overview

IBM Case Manager is an enterprise level software platform for the orchestration and completion of business goals and processes applying the case management concept. Case management is built around the concept of business processes that are goal-driven, unpredictable, and highly dependent on knowledge workers. This is structured around the concept of a case, which is the combination of data, content, activities, and people that are needed to achieve a goal within a business process. Case Manager coordinates the activities that are necessary to complete the business goal.

One of the key aspects of a case management solution is the ability to adapt the activities that are required to achieve the business goal. This often means being able to adjust to changing data, content, and task needs based on the characteristics of the individual case. For example, if we look at a commercial loan, each loan might require different documentation, approvals, and information dependent on the complexity and specifics of that loan. The activities needed to close a loan for a vehicle or piece of equipment is going to be significantly different than one for the construction of a new building, even though they might be both for the same customer and be part of the same loan department.

This is where the decisions, experience, and skill of the knowledge worker come into play. Often, the knowledge worker is the one who is responsible for ensuring that all of the proper activities are completed and everything is in place. IBM Case Manager provides the flexibility necessary to provide the knowledge worker with the ability to adjust to the demands of the case while still enforcing the constraints required by the business.

**Note:** For more information about IBM Case Manager, see *Advanced Case Management with IBM Case Manager*, SG24-7929.

#### Where Case Manager solutions are used

Many organizations across multiple industries use Case Manager to achieve their business goals. Cases can be found anywhere that a process can be unpredictable or exception driven. They are also applied when outcomes are driven by content or human decisions and interactions. These can be found across multiple industries in many departments, the following short list of samples is where case management is an ideal fit:

- ▶ Criminal and civil investigations (government)
- ▶ Court case management (government)
- ▶ Policy and loan underwriting (insurance and banking)
- ▶ Claim processing (insurance)
- ▶ Customer inquiry and complaint (cross-industry)
- ▶ Commercial lending (banking)

- ▶ Investment and wealth management (banking)
- ▶ Healthcare fraud and abuse (healthcare)
- ▶ Employee onboarding (cross-industry)
- ▶ Project management (cross-industry)

## **The impact of mobile**

The world changes; with the advent of powerful mobile devices, we find that more people are performing their work from nontraditional locations. Employees are more often found in multiples locations. An increased focus on customer satisfaction has accelerated with more businesses bringing their services to the customer's site. With a mobile workforce, organizations find themselves having to accommodate this mobility in their processes.

With case management being heavily dependent on the decisions and actions of the people within the process, the impact of a mobile workforce is even more dramatic. In many traditional environments, field workers leave the office to perform many tasks and the systems are updated only when they return to the office. This leads to many hours of lost time as work is waiting until the updates are received, data update often not happening until the end of the day. This can lead to many lost hours and a significant delay. Another side effect is an increased workload at the beginning of the day for the workers who are dependent on the completion of the activity.

IBM Case Manager allows the knowledge workers to have real-time access to their work in the palm of their hand. Through their smartphone or tablet, they can use the application to view any tasks that they are responsible for completing. This is especially powerful for users who perform their work in the field. They are now able to access and complete work wherever they are with access to decisions, content, and data.

In our use case, the Property Inspector is required to physically examine the property and submit photos from the inspection to the case. With the IBM Case Manager mobile application, the inspectors have instant access to all of the inspection tasks that they have in their in-basket and can use the mapping feature to determine which properties are nearest to their current location.

Figure 3-6 outlines how IBM Case Manager Mobile allows a user to see work from a list view.

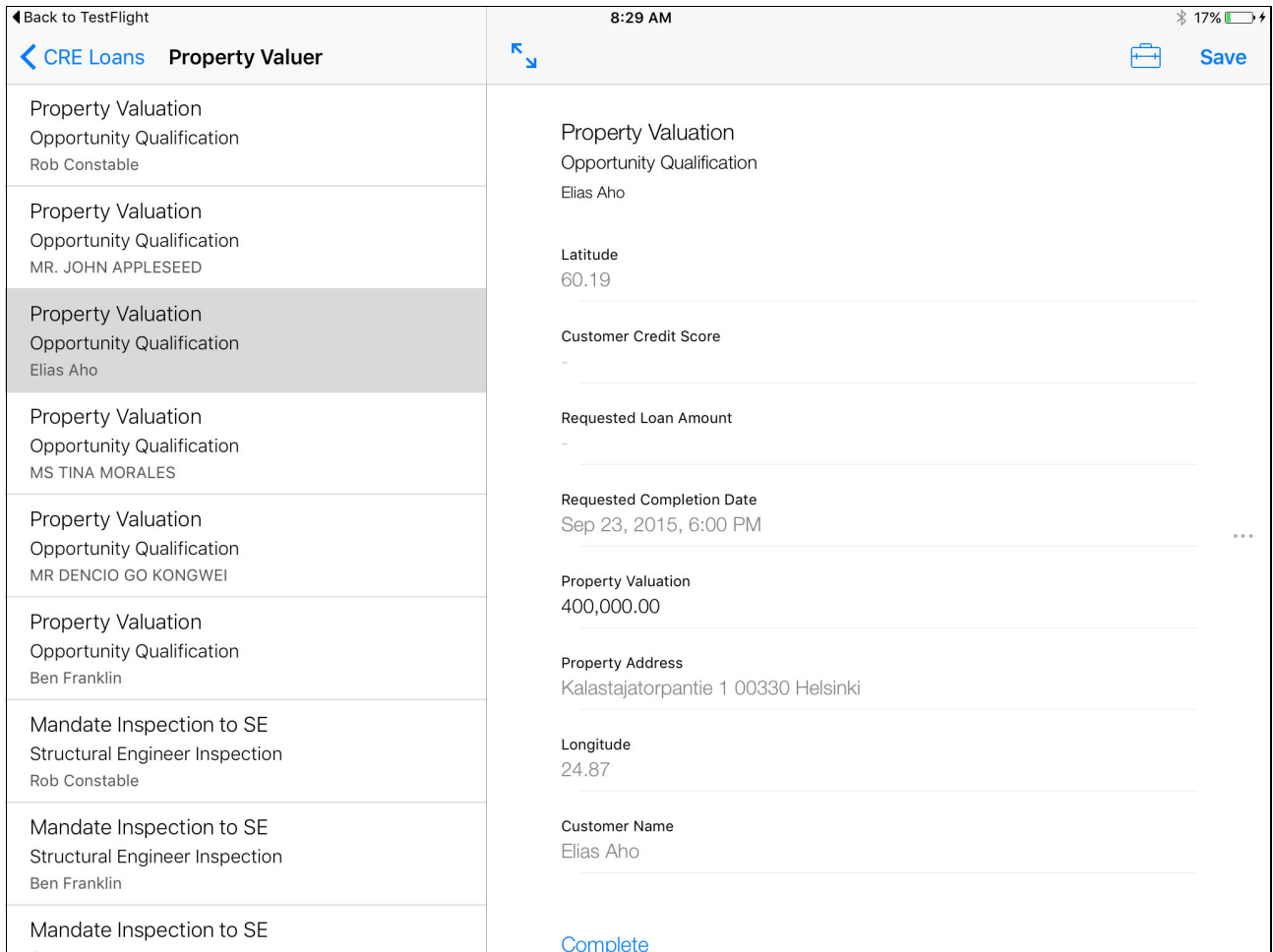


Figure 3-6 IBM Case Manager Mobile Role In-basket

Figure 3-7 outlines how IBM Case Manager Mobile allows a user to see work from a map view.

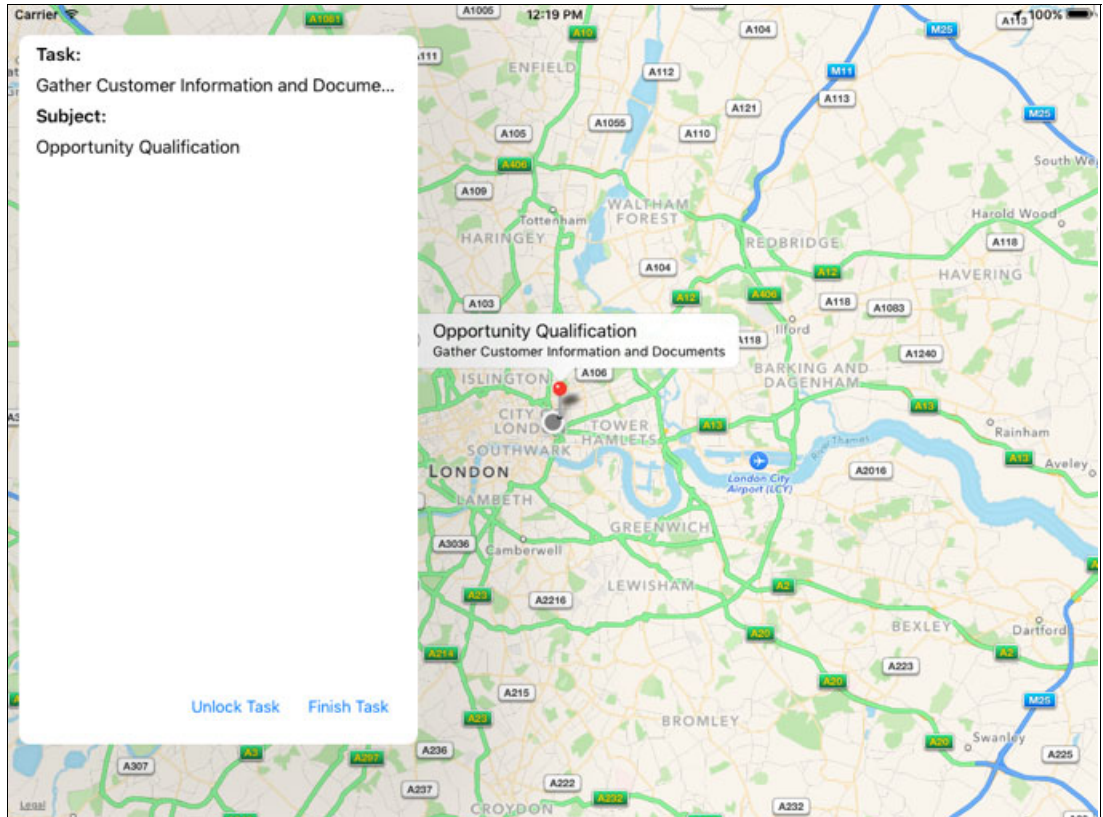


Figure 3-7 IBM Case Manager Mobile work near the user

The Property Inspector can look at the case information related to the selected task and have complete access to the data, tasks, documents and history of the case that they are working.

Figure 3-8 shows an open task and its properties.

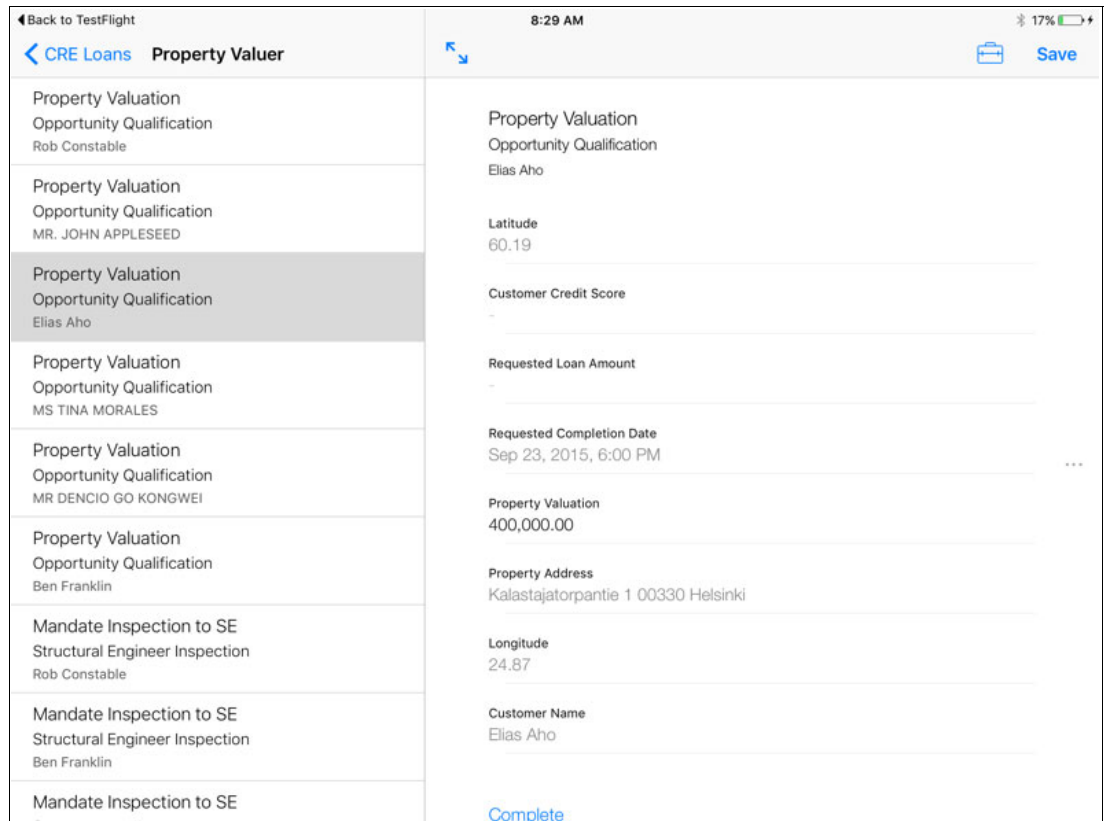


Figure 3-8 IBM Case Manager Mobile Case properties



Figure 3-9 shows an open case with the Task view.

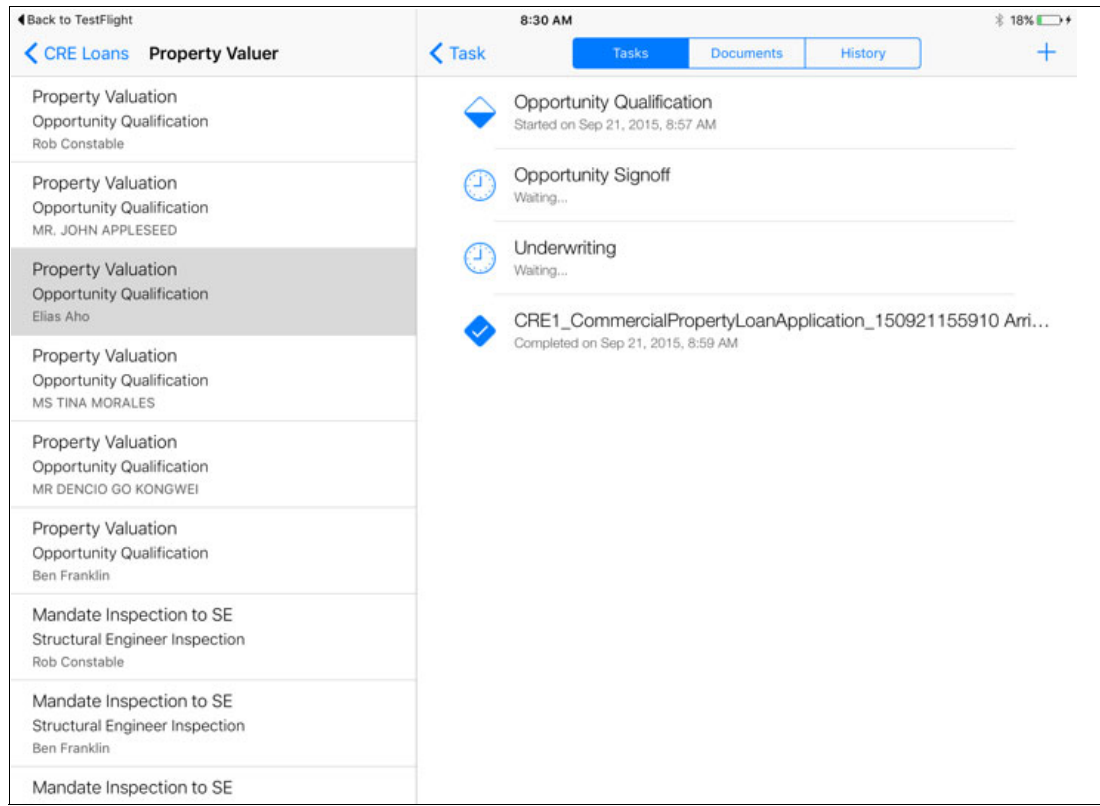


Figure 3-9 IBM Case Manager Mobile tasks for a case

This means that the inspectors can conduct their business in an efficient manner. Having direct access to the tasks on the mobile device allows the inspector to immediately file the photos into the case and complete the task. This means that the case can immediately react to the completed task and initiate the appropriate activities.

Figure 3-10 shows using IBM Case Manager Mobile to add a photo to the case.

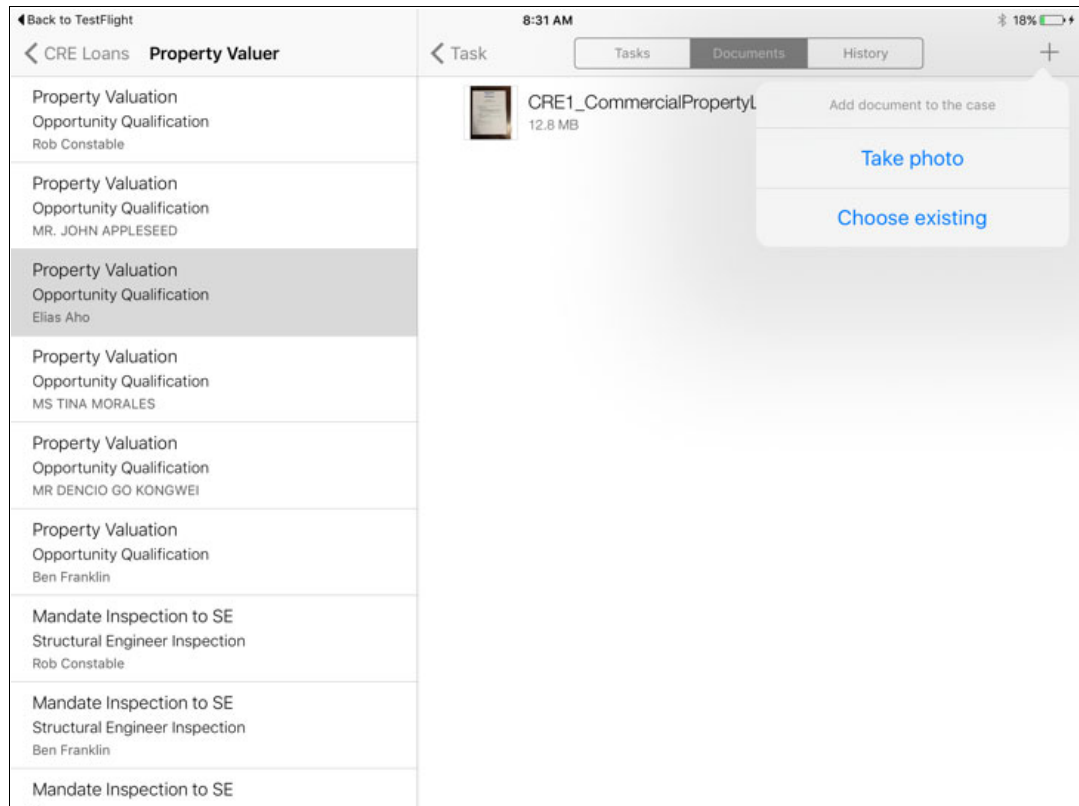


Figure 3-10 IBM Case Manager Mobile adding a photo

After they complete the actions for the task that they are working on, they can immediately decide about that task by completing the associated work. This will complete the Task and allow the Case to continue in the business process immediately.

Figure 3-11 shows using IBM Case Manager Mobile to complete a task.

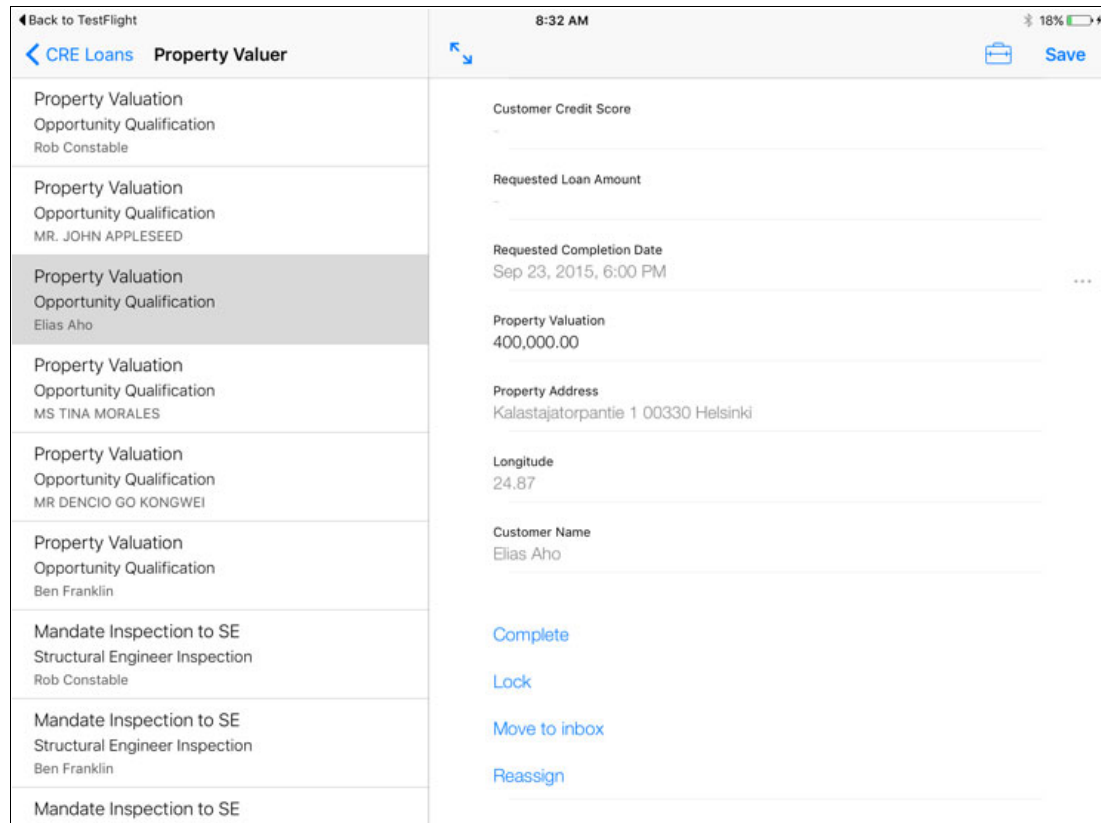


Figure 3-11 IBM Case Manager Mobile completing a task

## Benefit to the customer

The benefit of IBM Case Manager mobile is to provide case and task workers access to their work regardless of where they are. This results in measurable savings of time as the users are able to complete tasks that involve off site activities wherever they are. Traditional processing depended on the use of a notebook with connectivity. This is often difficult to use when a worker is mobile. Tablets and smartphones are designed to travel with the user and the smaller form factor provides additional flexibility in the places that they able to go.

An increased focus on customer service in competitive environments means that companies need to provide a higher-touch interaction with their customers. This means being able to provide service when and where required. Having access to cases from mobile devices provides the ability to achieve these goals.

Some of the following key benefits have been experienced:

- ▶ Having direct access to all case information. This provides a greater ability to answer customer inquiries or questions.
- ▶ The ability to add content from any location directly into the case. The content is immediately available meaning there is no wait for the next activities.
- ▶ Work can be completed from any location, meaning that field workers do not have to return to the central office or home office to be able to complete tasks.

### 3.3.2 Case Manager Mobile architecture

IBM Case Manager Mobile allows for the extension of an existing IBM Case Manager environment. This section outlines the architecture, approach, and impacts of applying IBM Case Manager Mobile.

#### IBM Case Manager Mobile architectural layout

The IBM Case Manager Mobile application provides users with access to Case and Task data by connecting through the IBM Content Navigator APIs in much the same manner that web based users interact with Cases and Tasks. This approach to develop the application minimizes the impact on the overall Case Manager infrastructure.

When an IBM Case Manager environment is in place, the IBM Case Manager Mobile Configurator plug-in is required to provide access to mobile devices. After this plug-in is installed and configured, users are able to access their work and cases through the IBM Case Manager Mobile application.

Figure 3-12 outlines how IBM Case Manager Mobile fits with the overall IBM Case Manager architecture.

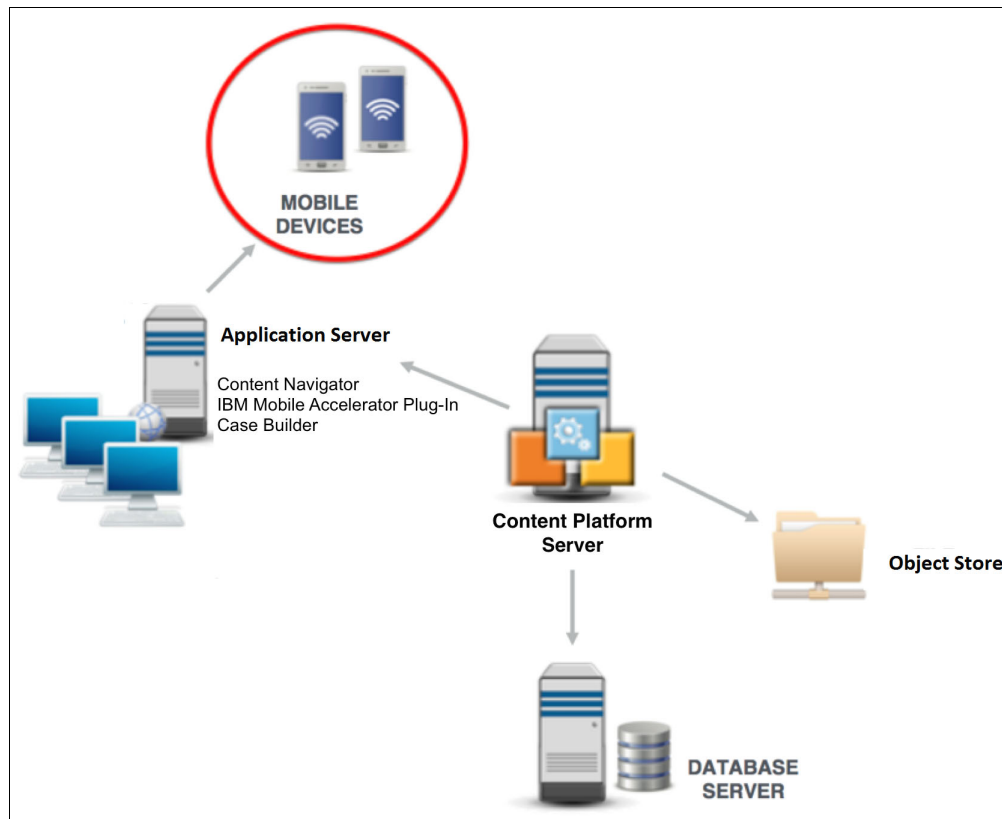


Figure 3-12 IBM Case Manager Mobile architecture

The Case Manager Mobile Configurator plug-in is required for the mobile app to access the Case Manager server. The configurator plug-in provides basic configuration parameters and enables branding and theming. *Branding* is a feature to add a customer logo without rewriting the app. *Theming* is the ability to change the color scheme without rewriting the app. The plug-in also streamlines the data flow between the mobile device and the server, which enhances the performance.

## **IBM Case Manager web user interface**

The Case Manager Client is a web-based interface that is built as a plug-in of IBM Content Navigator. This interface allows users to interact with cases, tasks, and content. The interface is a highly configurable widget-based layout and is often customized to meet the needs of browser based users.

## **Considerations for mobile applications**

When developing a solution where some of the users will use the IBM Case Manager Mobile application, several considerations must be accounted for when designing the solution, overall. Although any case solution can be made available to mobile users, certain steps can be followed to make that solution more efficient and valuable to those users.

An important aspect to note is that although solution changes can be made to better accommodate mobile users, changes are not required because the IBM Case Manager Mobile application is built to use any standard case solution without modification.

The first step in evaluating the impact of mobile to the users is to determine which roles will require or will commonly access their work remotely. It is in this step that you can determine the overall impact that mobile users will have on the solution.

For the mobile roles, the three primary points to consider are as follows:

- ▶ Whether the location is important to the person working the task
- ▶ Whether you want to display all the same properties in the mobile app
- ▶ Whether the order of property presentation is important

In instances where the location of the work is important to the user in selecting the tasks that they will perform next, the IBM Case Manager Mobile mapping functions can be used. When a task is associated with a specific location, the solution can be configured to be aware of the location of the activity. This provides the user with an additional method for work selection by viewing what are closest to their current location. Because the user is, by definition, mobile, this functionality adds increased flexibility and efficiency that is not available in the web based interface.

IBM Case Manager provides a complex property layout interface that allows for the configuration of multiple properties into a layout that is familiar to the web users. Mobile platforms do not provide the same interface size and space to the users. With this being the case, being able to adjust the property layouts to a format that is compatible with mobile devices becomes necessary. The IBM Case Manager Mobile application is able to use property layouts that are configured to be mobile-aware and present the properties to match the configured layout.

## **IBM Case Manager development**

IBM Case Manager provides the IBM Case Manager Builder, which is a web application tool designed to create and deploy case solutions. Within Case Manager Builder, users are able to define these items:

- ▶ Properties
- ▶ Roles
- ▶ In-baskets
- ▶ Documents
- ▶ Pages
- ▶ Case Types
- ▶ Case Properties
- ▶ Case Tasks

Through the IBM Case Manager Builder, complete solutions can be developed to meet a wide variety of business applications and business goals. The Case Builder was designed so IT departments can work with the business to develop applications in an iterative and flexible environment.

### ***IBM Case Manager Mobile impacts on case development***

Though changes are not required to utilize a Case Manager solution within the mobile application, the following changes can be made to a solution to use extra functionality that is available:

► **Property definitions**

The mapping function of the IBM Case Manager Mobile application is dependent on the existence of case properties that define the latitude and longitude values of the location of the case. This necessitates the creation of two solution properties:

- Latitude: A float property that uses the unique identifier <<prefix>>\_latitude.
- Longitude: A float property that uses the unique identifier <<prefix>>\_longitude.

These properties must also be applied to any case types that require these properties and present the case location within the mobile application.

► **Property layout definitions**

For instances where a specific property layout being used for mobile applications is wanted, a standard Properties Layout view can be created in a format that is usable by the mobile application. The name and structure of the Property Layout view must adhere to the following structure in order to be usable by the mobile application:

- The name of the view must be structured as <work\_subject>\_mobile (for example, investigation\_mobile) so that the mobile application is able to select the proper Property Layout view to use.
- The Layout itself must follow the formatting that the mobile application can use. Only the following containers are supported:
  - Property List
  - Layout
  - Titled Layout
  - For each container, they must be configured with the following settings:

```
Layout direction = Vertical  
Label position = Above
```

All other settings are still applied within the web browser interface but are ignored by the mobile interface.

## **3.3.3 Case Manager Mobile deployment**

The IBM Case Manager App functions interact directly with a standard IBM Case Manager installation by using the solutions deployed within the environment. The IBM Case Manager Mobile iOS application is available on the Apple App Store for no charge. Users can download the app and manually configure the connection, user and password.

### **Server requirements**

The September 2015 version of the IBM Case Manager Mobile application requires an IBM Content Navigator server with version 2.0.3.5 or newer and IBM Case Manager 5.2.1. The Case Manager Mobile Configurator is added as a standard Content Navigator plug-in to enable mobile access to the Case Manager environment. After the plug-in was loaded and configured, the mobile app can be used to access the Case Manager environment. Within the

client side, the mobile application user can configure the application through the settings window to reference the Case Manager URL of the desktop that is used. No solution modifications are required besides the recommendations outlined within this document.

## Device requirements

The September 2015 version of the IBM Navigator Mobile application requires an iPhone or iPad running iOS version 8.4 or newer. The app currently runs in portrait mode only.

## MDM configuration

As explained in Chapter 2, “Securing mobile applications” on page 5, mobile device management solutions can support a basic set of app distribution and containerization without direct integration with a mobile app. Additional Master Data management (MDM) features are available when the native app includes integration for a specific MDM vendor or when the application is redistributed after being wrapped or customized.

The IBM Navigator Mobile app currently supports MaaS360 MDM. In addition to security and containerization features, mobile administrators can also use MaaS360 to preconfigure the mobile app by pushing the User ID and Navigator Server URL configuration into the IBM Navigator Mobile app. Eliminating the manual entry makes mobile deployment easier.

To distribute a configuration with MaaS360, first create a JSON file with your configuration values. Example 3-2 shows a sample configuration file.

*Example 3-2 Sample configuration file*

---

```
{"version":1.0,"url":"https://yourserverhostname/navigator/", "username":"%username%", }
```

---

Next, edit the Workplace Persona policy, enable the container, upload your configuration file, and publish the updated policy. For more details about how to configure the app with MaaS360, For more details about how to configure the app with MaaS360, see the IBM Knowledge Center for Content Navigator:

<http://www.ibm.com/support/docview.wss?uid=swg27041953>

### 3.3.4 Case Manager Mobile customization

The IBM Case Manager Mobile allows two levels of customization:

- ▶ The configurator plug-in allows branding and theming to be applied without code development.
- ▶ The IBM Case Manager Mobile SDK is available for iOS and can be used to develop customized applications to meet requirements that are not met through the configurable options.

#### IBM Case Manager Mobile iOS SDK

The iOS SDK includes the libraries required to create a custom Case Manager mobile application, and also includes a sample mobile application written in Swift.

**Note:** The IBM Case Manager Mobile iOS SDK requires a MacOS computer, Xcode, and CocoaPods to build the sample. The version of Swift in Xcode 7.0 differs from 6.4, so we suggest using Xcode 6.4 to compile the sample. iOS 8.4 or newer is required on the mobile device.

## Custom Case Manager application example

For this paper, we developed an iPad application to show what can be accomplished with the Case Manager Mobile SDK. This sample application enables mobile workers to process tasks and update cases. For more detail about this sample application, see 4.3, “Using Case Manager and Datacap to build composite solutions” on page 49.

## 3.4 IBM Datacap Mobile

In today’s market, customers expect answers to their questions in real time. They expect paper-based requests to process in a similar time frame as digital requests. In short, the customer expects greater and faster functionality.

One possible way of meeting this demand is to capture your paper-based documents at the point of origin. Capture the image while the signature is still wet on the page or at the point of customer interaction. By capturing immediately, this removes delay in transferring the paper to a central location for preparation and scanning. It also removes the risk of loss or theft of highly sensitive documents.

Other use case scenarios include mobile workers who are away from the office for extended periods of time. They might also work in more remote locations where transport of a dedicated scanning device is simply not practical or possible.

This section provides information about the capabilities and considerations of using readily available mobile devices, such as mobile camera phones or tablets for document and image capture.

It also covers a simple real-life use case for the application of such capabilities. It describes how this particular use case can be developed into a working solution using IBM Datacap and IBM Datacap Mobile. This section discusses the following topics:

- ▶ IBM Datacap overview
- ▶ IBM Datacap Mobile architecture
- ▶ Considerations for mobile capture
- ▶ IBM Datacap Mobile customization
- ▶ IBM Datacap Mobile deployment
- ▶ Datacap Mobile use case

### 3.4.1 IBM Datacap overview

IBM Datacap is a powerful enterprise-level software platform to capture content from a variety of entry points, in differing formats, and extract indexing and application data for storage into various back-end systems. It helps eliminate labor-intensive document preparation and manual data entry, therefore, expediting the capture process. Also, by application of validation rules, it can improve data accuracy.

IBM Datacap can help with the following tasks:

- ▶ Capture content from various ingestion points, including scanners, multifunction devices (MFDs), fax servers, email systems, web enabled mobile devices, and file systems.
- ▶ Capture machine print, handprint, check box, and bar code data using multiple recognition engines, such as optical character recognition (OCR), intelligent character recognition (ICR), and optical mark recognition (OMR), to reduce manual data entry.
- ▶ Classify documents using advanced multiple options for locating and processing data on unstructured documents, including content analytics from IBM Watson



- ▶ Apply validation routines and methods using database lookups, mathematical calculations, patterns, and check digits to ensure accuracy of the captured data.
- ▶ Integrate with various IBM and non IBM Enterprise Content Management (ECM) repositories, including IBM Content Manager, IBM FileNet Content Manager, IBM FileNet Image Services, OpenText LiveLink, EMC Documentum, and Microsoft SharePoint.

### **IBM Datacap development**

IBM Datacap provides two approaches to building capture applications. These are using either of the following features or a combination of them:

- ▶ IBM Datacap Studio
- ▶ IBM Datacap FastDoc

#### ***IBM Datacap Studio***

This development environment enables application developers to build an application from the ground up using either a template framework approach or, if needed, their own approach and methodology. This provides powerful and granular customization of the capture application. Its use is primarily for IT and application developers who need low level control of the capture process based up use of actions and rules.

#### ***IBM Datacap FastDoc***

This development environment has a base template approach to application development. It provides an entry-level user interface (UI), and Rapid Application Development (RAD) to expedite and standardize the development process. Its use helps to standardize the capture development approach, and simply the development for more business oriented application developers who are more aligned to the process and high level functionality. The use of compiled rulesets help in this process as they provide a simplification layer over the use of action and rulesets.

After the core application is developed, the application developer can then use IBM Datacap Studio to make more detailed refinement and enhancements to the capture application if needed.

We suggest using IBM Datacap FastDoc as the tool for building the server side component of a Datacap Mobile capture solution.

### **IBM Datacap details**

For further information about the Datacap Server components of a capture solution, consult *Implementing Document Imaging and Capture Solutions with IBM Datacap*, SG24-7969.

## **3.4.2 IBM Datacap Mobile architecture**

IBM Datacap Mobile provides on-the-edge capture capabilities such as on device OCR, image deskew, image rectify, and so on. It also provides connectivity to IBM Datacap Server through IBM Datacap Web Service (wTM). This allows the interaction of the mobile device to upload images for further processing on the server, along with additional data processing steps.

There are benefits of executing processes such as OCR and image deskew on device versus use of a centralized server. For example, uploading images for extraction or enhancement adds time to the process. It also requires that the device be connected to the centralized server over a suitable network connection to be able to function as desired.

There are however, benefits of using a central server to execute certain tasks on device. It might be that certain data processing tasks are not suited to mobile device execution. For example, the query of an identity card, or passport number to a centralized secure service should be executed centrally on the server versus on the edge mobile device. Capture of data from large quantities of images can also be run on the central server simply due to the quantity of images and power/time needed to execute such a task.

The central server can also be leveraged for management of mobile users of the system to determine what tasks they can perform on the mobile device app. It also allow users to be added or rejected from the system as dictated by company policy.

We therefore decide, on a case-by-case basis, the best approach for the capture process. It can be that a high percentage is executed on device, or it can be a more centralized approach that is required.

### Mobile capture architectural layout (Central server)

Figure 3-13 shows where the mobile devices are in a central server architecture of Datacap.

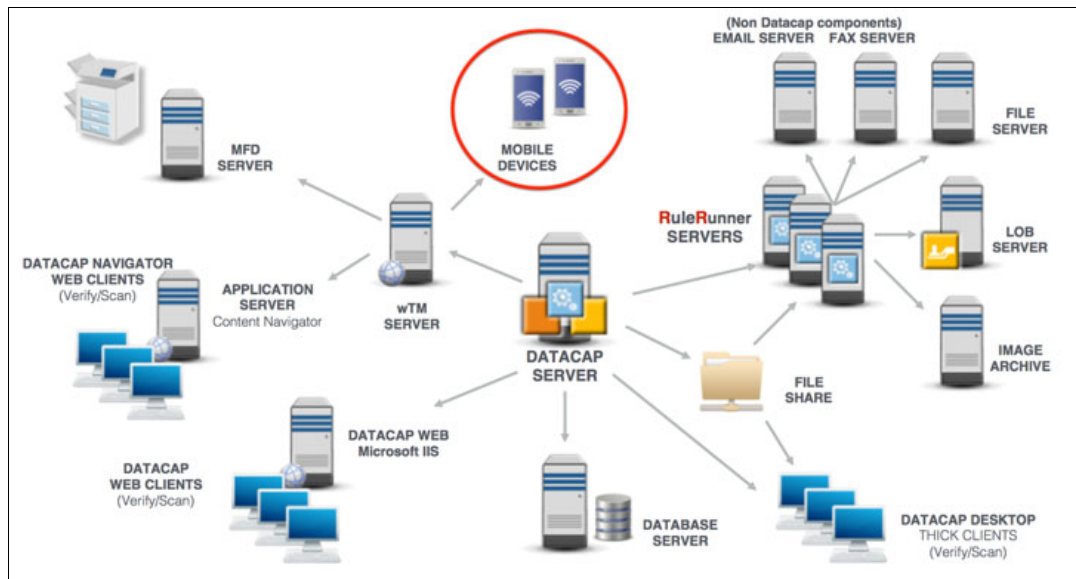


Figure 3-13 Mobile capture architectural layout

IBM Datacap Server forms the central service for the IBM Datacap system. It manages and serves batches to workstations and users, orchestrates tasks, provides user authentication and access control, assigns batch IDs, controls batch queuing, and controls access to the Datacap databases.

Datacap Web Service (wTM Server) forms the connection between the IBM Datacap Server and IBM Datacap Mobile. This Web Service exposes a number of endpoints for use by IBM Datacap Mobile. These endpoints include the ability to authenticate, upload images for server side processing, check for a process state and completion, and retrieve the results from a process. To ease the use of these endpoints, the Datacap SDK exposes a simplified set of methods to simplify interaction programmatically for the mobile developer. This is covered later in this section.

For a more in depth details of the working and layout of a Datacap Server System, see *Implementing Document Imaging and Capture Solutions with IBM Datacap*, SG24-7969.

## Datacap Web Services (wTM)

The IBM Datacap Mobile makes use of IBM Datacap Web Services (wTM), which was released in IBM Datacap v8.1. This has been significantly enhanced in IBM Datacap V9 to allow interaction through mobile devices.

wTM can be deployed either as a Microsoft Internet Information Services (IIS) application or as a stand-alone service on Windows without the need for IIS.

Interfacing to these wTM REST endpoints over a network, and using them in a variety of combinations, enables interaction between IBM Datacap Mobile and IBM Datacap Server.

For an introduction to representational state transfer (REST), read “RESTful Web services: The basics” article that is available at IBM developerWorks® web page:

<http://www.ibm.com/developerworks/webservices/library/ws-restful/>

If you are interested in exploring this topic further, IBM provides a test tool created to introduce wTM. The test tool is located at the developerWorks web page:

<http://www.ibm.com/developerworks/apps/download/index.jsp?contentid=832522&filename=wTMSample.zip&method=http&locale=>

For further information in general about the IBM Datacap Architecture and wTM features, see *Implementing Document Imaging and Capture Solutions with IBM Datacap*, SG24-7969.

## Mobile capture architectural layout (Mobile SDK)

IBM Datacap Mobile architecture is based upon a combination of the Datacap Server, Datacap Web Service and the IBM Datacap Mobile SDK.

IBM offers the IBM Datacap Mobile SDK to help simplify the development process for the mobile app developer. It makes use of a layered approach to hide the more complex integration points, and expose reusable, ready-for-use capabilities for image capture.

For example, IBM provided the camera controller for automatic capture and cropping of paper documents such as identity documents and forms from the wider context of the image. This is done automatically in real time. By providing this capability, the mobile app developer does not need to redevelop the functionality from zero, it is simply a case of reuse. This expedites development time and provides tested and supported modules for use in the final app.

The Datacap SDK offers these core capabilities:

- ▶ Connect to a Datacap application and access the DCO through the object library.
- ▶ Capture sets of documents or images using a camera controller UI.
- ▶ Set batch, document and page fields.
- ▶ Perform client-side OCR or barcode capture.
- ▶ Perform image processing include deskew, brightness and contrast filters.
- ▶ Upload a set of documents to your Datacap server.

The IBM SDK uses the following three layers.

- ▶ User Interface Layer

This provides the capabilities presented to the user of the app. This forms capabilities such as image editing, field editing, document assembly, login details, camera controller, and so on. These UI components are designed to allow interaction with the user and pass the results down to the domain controller for object update and interaction.

► Domain Controller

This provides the object structure to which the capture process will adhere. This includes the Datacap Object (DCO) that was downloaded from the Datacap central system. It also performs and manages the image and OCR processing routines (either from IBM or a third-party resource).

► Network Layer

This provides the interface to the Datacap wTM REST based web service to allow client authentication, and interaction between the mobile capture application and the Datacap wTM Server. Upload, offline mode, and others are all managed at this level.

Figure 3-14 depicts the layers of SDK and the components in each layer.

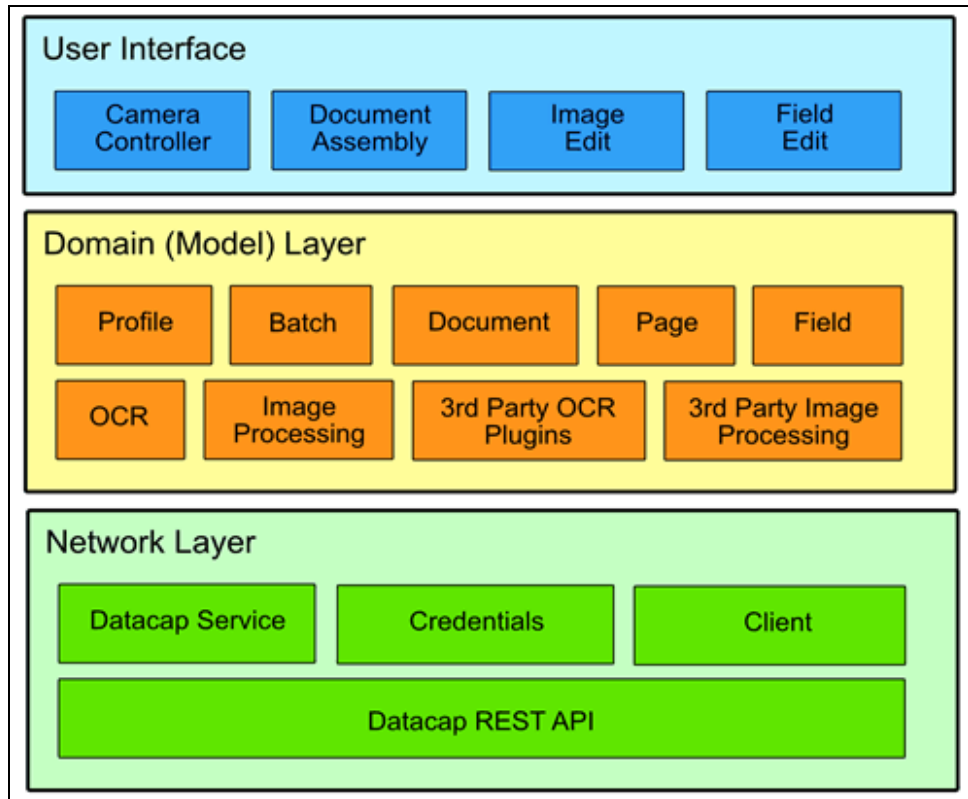


Figure 3-14 SDK layers

Use of this SDK approach removes the requirement to understand the underlying Datacap wTM REST service in great depth. Instead, the developer can concentrate on app development and leveraging specific methods with the SDK.

The IBM Datacap Mobile app for iOS enables you to seamlessly capture, process, and upload documents to an IBM Datacap server. The IBM Datacap Mobile SDK and Developer's Guide provide app developers with the APIs and documentation for customizing and extending the mobile app. For more details and current information about the mobile SDK, see this page:

<http://www.ibm.com/support/docview.wss?uid=swg27045995>

### 3.4.3 Considerations for mobile capture

Use of a camera on a mobile device differs significantly from the traditional scanning approach. Cameras can distort images in a variety of ways. Here we cover a few of the challenges to consider when using a mobile device.

#### **Exposure used**

Exposure is about how much light is let into the camera at the point an image is captured. Too much light, and your images appear washed out; too little light, and they will be too dark. It is possible to correct a poorly exposed image using software, but only to a certain degree. Getting the lighting correct is an important part of the image capture process.

#### **Image angle**

If the paper is not aligned 90 degree to the camera, it can appear distorted. This is known as the keystone or tombstone effect. The captured image results in dimension distortion, making it look like a trapezoid, the shape of an architectural keystone. When applying technologies such as OCR, this can cause undesirable results due to differences in character size and shape. It also does not provide a suitable representation of the original document for storage. It is possible to correct a misaligned page using the mobile SDK keystone rectify process.

#### **Image sharpness**

Because a mobile device is operated by a user who is holding the device, there is the possibility of hand shake or wobble. This can cause image blurring not usually encountered when using a stable desk scanner. This can affect the quality of the captured image, affecting the definition of the image characters and therefore the OCR results. The mobile SDK is developed to ensure the most optimal image is captured and to reduce this issue

#### **Image skew**

Although skewing still occurs on dedicated scanners, it can be more acute on a mobile device. When using a mobile camera, there are no physical guidelines or rails to align images against. Therefore, obtaining that perfectly aligned scan is tricky. Use of software can deskew images. Typically, this is done by identifying lines and words on a page, and using these as the reference point to determine the skew angle. Typically, the skewing issue is rectified on mobile using the keystone rectify process detailed earlier.

#### **Image resolution**

The image resolution used determines the level of detail used to capture an image. The greater the resolution in dots per inch (dpi), the more detail that can be captured, and therefore interrogated, during the capture process. Similarly, the lower the resolution used, the less detail that can be captured. The result is that OCR results can differ greatly depending on the resolution used.

The trade here is that the higher the resolution used, the larger the file size, and therefore an increase the storage cost. In the case of mobile capture, the amount of bandwidth required to transfer the image also increases with image size, which can also exacerbate cost and upload times. An optimum image size and resolution is therefore desirable.

#### **Color versus black and white**

Mobile cameras, by default, take an image in color and then convert it to black and white. As with any conversion, there is the possibility of losing definition or detail captured originally. The other consideration is that color images are typically larger than black and white images. The use of black and white versus color should be considered on a case-by-case basis to ensure it meet the requirements of the use case.

## The user

With all of the considerations, we must also factor in the user. Mobile capture users typically have had no education about how to prepare or scan documents optimally. Some will not be too concerned if the image is skewed or distorted. In their minds, the image is captured, so their job is complete. Therefore, we should look, where possible, to guide these users into capturing an optimal image. This could be with on screen prompts, image capture guide boxes, or step-by-step process guides.

### 3.4.4 IBM Datacap Mobile customization

IBM Datacap Mobile makes use of an SDK to simplify development efforts for our customers and partners. Customers and partners can use this SDK to add functionalities to existing apps, or use it as the basis for new ones. SDK is developed in such a way as to reduce development times for the app developer. This is achieved by providing ready-for-use typical functions and methods needed by the developer. Core functionality such as document and image identification and rectification are provided within the SDK. It also helps reduce the need to understand some of the deeper technicalities of the Datacap system.

On the Apple App Store and Google Play you will find the IBM Datacap shrink-wrapped app that is developed using the IBM Datacap Mobile SDK. This shrink-wrapped app is intended to allow customers, partners, and so on access to a sample demo app to show all the base functionality available. The shrink wrap app is not intended for production usage.

IBM suggests that customers and partners use the IBM Datacap Mobile SDK as the base framework for app development for capture. By using the SDK, it will reduce development time and allow reuse of tested and support functionality.

#### Prerequisites for development

The IBM Datacap Mobile SDK package includes the following components:

- ▶ SDK frameworks for device and simulator
- ▶ A sample Xcode or Android project containing a working application
- ▶ Developer reference documentation

At the time of publication, these are the prerequisites for iOS SDK:

- ▶ An IBM Datacap server running IBM Datacap 9.0.0.1+
- ▶ An Apple Mac running OS X 10.10+, with Xcode 6.3+ installed
- ▶ An Apple Developer Account
- ▶ The IBM Datacap Mobile SDK 1.0.0.0+ package
- ▶ A working knowledge of Objective-C
- ▶ IBM Datacap 9.0 system with Feature Pack 2 or greater

Further information, see the following web page:

<http://www.ibm.com/support/docview.wss?uid=swg27045995>

At the time of publication, these are the prerequisites for Android SDK:

- ▶ JDK 6 or later (JDK 7 for Android 5 Lollipop and later)
- ▶ Android Studio, including Android Studio IDE and Android SDK (V 22 or later)
- ▶ The IBM Datacap Mobile SDK project
- ▶ A working knowledge of Java
- ▶ IBM Datacap 9.0 system with Feature Pack 2 or later

For more information, see the following web page:

<http://www.ibm.com/support/docview.wss?uid=swg27046056>

### 3.4.5 IBM Datacap Mobile deployment

Consideration must be given to the distribution of mobile apps. In the corporate environment management processes have to be defined for security policies, device types being used, device ownership, and so on. This determines who has access to the app, what features are available, and how the device itself is managed.

Deployment and management of mobile apps can be achieved in a number of ways:

- ▶ The sample shrink wrap app is generally available on the internationally available Apple App Store for no charge. Simply search for IBM Datacap and download. The same is true for Google Play. This is typically how a general user obtains apps.
- ▶ The sample shrink-wrap app can be deployed from the App Store using a Mobile Device Management (MDM) console, that is, MAAS360, AirWatch, Good, MobileIron, Citrix, and so on. These MDM solutions have the feature to deploy apps from the app store. MDM is an industry term for the administration of mobile devices. Apps can be deployed in either a push or a pull approach.
  - Push: The MDM solution pushes the app to the device without interaction of the user. This can be automated and managed by a system administrator.
  - Pull: The user enters the Enterprise App Store on MDM. This is a company-specific App Store with apps tailored to the needs of the company. The user chooses the app and download as needed.
- ▶ For deployment of custom apps, see Chapter 4, “Building custom and composite mobile applications” on page 45.

For further information about MAAS360 MDM, visit the following web page:

<http://www.maas360.com/products/mobile-device-management/>

### 3.4.6 Datacap Mobile use case

In this paper, we use the IBM Datacap Mobile SDK to deliver a mobile app capable of capturing identity documents, forms, and general documents. In this use case, we capture the following documents:

- ▶ ID card, that is, driving license or passport
- ▶ Proof of residency, that is, form 6166
- ▶ Proof of earning, that is, employment pay slip

The mobile app provides the mechanism for capturing these paper based documents at the point of request. No need to visit a location, use a desktop scanner or send the documents off for processing. All capture and processing is dealt with on device.

For the mobile capture use case IBM Datacap Mobile allows the user to capture these documents on their mobile device. This is done in a simplified way to allow quick and easy capture. The mobile app is designed in such a way to remove the complexities involved in this process and addresses the issues discussed in 3.4.3, “Considerations for mobile capture” on page 39.

The app is designed to guide the user through the document capture process. This is done to simplify and streamline the process. Firstly, the user is asked to scan in their ID card. In this example, we use a driving license. The user points their mobile device camera at the document and the mobile app automatically detects the driving license in the context of the wider image. This is all done in real time. When the quality of the image is sufficient, the app locks on the document and it is captured. The angle of the captured image is rectified by the on device software to provide a squarely angled image suitable for processing in a capture system. An example figure is shown in Figure 3-15.

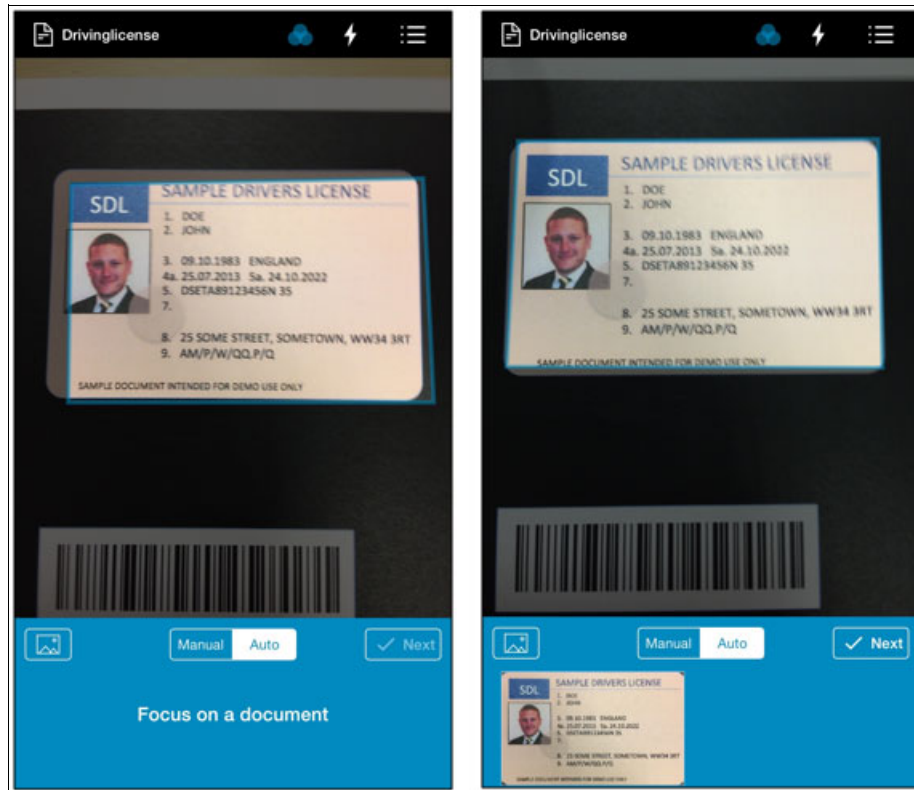


Figure 3-15 Sample ID image

With the use of on device OCR, the app can populate a specific number of fields required as part of the capture process. This removes the need to manually enter in the data from the image. The user simply selects a field to complete by tapping it with their finger, selecting the OCR option, and drawing a box around the area of the image they want to capture, that is, their name or driving license number. The captured text is then populated in the field for processing automatically. There is no need to upload the image to a server, as all processing occurs on device.

If data is required from additional sources such as barcodes, this can be done by simply presenting the camera to the barcode. The app will extract the relevant data held in the barcode and populate the field.



Examples of this capture are shown in Figure 3-16.

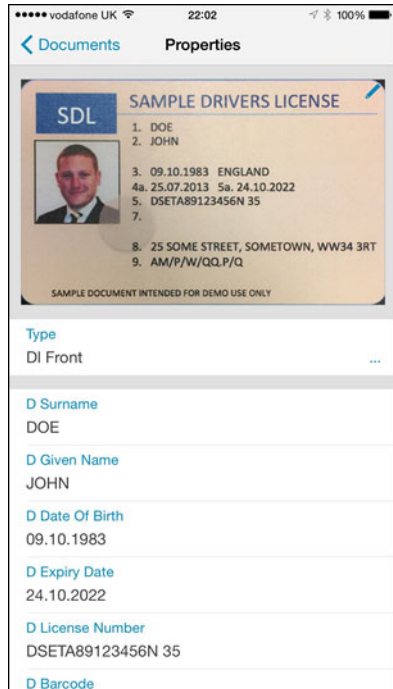


Figure 3-16 Processed image

When capture of this document is complete, the user is then guided to capture additional documents requested by the process. These are the dealt with in the same way as before.

As each document is captured the user is presented with a screen and a tick next to the capture document. This gives a clear indication on the progress the user is making in the process.

When complete, the user is now able to upload the captured documents to the capture system. The image, along with the data captured from the document is uploaded to the central Datacap System.

This completes the users transaction for mobile capture. As you can see, this process is simplified and streamlined to minimize mistakes and expedite the capture process.

After the image and data is uploaded, the data captured can, if needed, be interrogated further. Routines such as check-digit checks can be used to ensure the accuracy of the data. The confidence of the OCR data can also be checked to help highlight any suspect OCR results. Any issues can be routed for fixup or verification by a centralized group of users. Similarly other rules such as min and max values and regular expression can be used to ensure validity of the captured data. This is an important consideration in any capture solution. It helps ensure quality data is used in the system, which in turn reduces issues further down the line.

For the use case, to ensure the validity of the document, IBM Datacap Server components send the driving license identity number, along with the drivers name to an external service for further validation and proof of originality. This service is provided by the driving license issuing authority for validation purposes. If an exception occurs, this is then dealt with by a central user. The nature of the error determines where the fix should occur. If the issue lies with incorrect OCR, then this can be rectified in the capture solution.

If however the OCR is correct, yet the name does not match the driving license number, this is then raised for rectification by the case worker inside of IBM Case Manager for further investigation and remediation.



## Building custom and composite mobile applications

Custom apps are a popular way to gain efficiencies or competitive advantage for business workflows. Apps are often designed to accomplish user journey or task in a focused manner. Therefore, custom apps commonly remain compact and atomic, and indeed, this is a principal advantage. App users are then empowered to select a combination of focused products from an app store or catalogue in order to best solve their individual needs.

Custom or composite mobile apps can be created for popular mobile platforms using a number of different developer tools. Options usually fall into one of three categories, native, hybrid, or web apps.

This chapter describes the usage of SDK in developing ECM Mobile applications. We cover the following topics:

- ▶ Introduction
- ▶ Developing with IBM ECM Mobile APIs
- ▶ Using Case Manager and Datacap to build composite solutions

## 4.1 Introduction

Custom or composite mobile apps can be created for popular mobile platforms using a various developer tools. Options usually fall into one of three categories: native, hybrid, or web apps.

Native apps provide a write once, deploy once, run on one platform model. Native apps are designed to be first class citizens of their respective platforms, offering the best user experience, full access to device instruments, and the latest APIs. Often overlooked is that if engineered correctly these applications remain compatibility with future versions of their host operating system, reducing maintenance costs.

The main disadvantage of *native apps* is that if you require apps built for multiple platforms, you will require multiple code bases.

On iOS, Apple offers the Xcode Integrated Development Environment (IDE), and a choice of either Objective-C or Swift languages. The toolchain uses the llvm compiler with a front-end named *clang*.

The following list describes several commonly used tools for building native apps:

- ▶ Xcode

Xcode provides the Interface Builder tool for visual editing. It also provides storyboards, a way to model the flow of an app between different screens. Interface builder integrates into code using outlets, special properties and methods that are marked so as to allow integration.

- ▶ Interface Builder

Interface Builder provides built in support for localization and addition of accessibility features.

Xcode is included with the iOS Simulator, which is a Mac based simulator for iOS devices (iPhone, iPad, Apple Watch, Apple TV). Xcode is only available for Apple Mac systems.

For Android, Google provides the Android Studio IDE, which sits on top of the Android Native Development Kit (NDK). The NDK uses a GCC based compiler. Apps run in the Dalvik Virtual Machine.

- ▶ Android Studio

Android Studio provides the Layout Editor for visually designing apps. Layout Editor provides localization and theming support.

- ▶ Layout Editor

Android Studio also provides the Android emulator which can be used to emulate Android devices and input methods. Android Studio is available for Windows, Mac, and Linux.

**Note:** There is a fundamental difference between a simulator and an emulator. An *emulator* replicates outward appearance (that is, screen size). A *simulator* models internal workings. You might expect a simulator to accurately replicate threading models for example.

*Hybrid apps* provide a write-once, deploy-through-many-app-stores promise, and run native model. The advantages of hybrid apps are that they provide access to native APIs, while running cross platform. They achieve this through internal toolchains that compile a single language down into multiple native binaries, or graft HTML5 (HTML, CSS, or Javascript) together with a native wrapper. For example Ruby Motion or Xamarin offers the ability to write in Ruby or C# and compile down to fully native interfaces. Phonegap is a toolchain which enables compilation of app wrappers from an HTML5 base.

Disadvantages of hybrid apps are that they add another dependency into the toolchain. They also require second order updates (that is, after the platform vendor has updated the operating system, the hybrid toolchain vendor is then required to perform an update). The hybrid HTML5 experience is also of lower quality than the fully native experience, while the hybrid to native toolchains might not provide full access to native APIs. HTML5 apps also suffer many of the problems discussed below in Web apps.

*Web apps* provide a write once, deploy once, run anywhere model. Advantages of web apps are that they can run across desktop, tablet and mobile, are not deployed through an app store so can be updated at any time, and use technologies less exposed to a single corporate entity and overseen by standards bodies. However, web apps will often use one or multiple frameworks (for example, jQuery, Twitter Bootstrap or one of many others), which are aligned to a corporation. Browser fragmentation is a challenging issue - different versions of operating systems on multiple platforms can make it difficult to achieve high levels of polish. Web apps cannot use native APIs or to a large degree device hardware.

Each category offers pros and cons across different axis. For this reason it is important to review project success criteria before making technology choices.

## 4.2 Developing with IBM ECM Mobile APIs

IBM has created iOS and Android mobile SDKs for three important areas of Enterprise Content Management - sync and share, case management, and content capture.

The SDKs are written using native code and libraries to provide optimum performance, allowing developers to quickly build high quality content apps.

All SDKs include a Developer Guide, developer reference documentation, and a sample app. The intended use of these artefacts is for the Developer Guide to be the entry point for use of the SDK, providing instructions on how to begin using the SDKs and discussing preconditions and limitations. The sample app gives a working demonstration of the SDKs in use and can be run on different devices or the simulator. The Developer Guide should be used as an ongoing reference while building your apps.

The SDKs also include two library components. The first is a Core library component, containing an object model, persistence options, networking and other utility operations. The second is a UI library containing prebuilt UI components.

The Datacap iOS SDK Core library for example contains model objects to represent documents, pages, fields and characters. By configuring the SDK factories used to create these objects the developer controls whether and how these model objects are persisted. This library also contains networking functions for uploading documents, and low-level utilities for page image recognition and manipulation. The Datacap iOS SDK UI library contains a camera capture component (ICPCameraController) that encapsulations hardware operation with filtering and live edge detection, and can be presented on screen using the standard Model-View-Controller mechanisms.

## 4.2.1 SDK design

The APIs favor composition over inheritance. The approach to the Cocoa libraries favors a flatter object inheritance hierarchy and relies on the delegate pattern for customization. Many libraries, especially GUI libraries, suffer from complication due to hierarchy bloating to the point that determining which class you would inherit from is not clear. Most modern object systems use composition paradigms where objects are constructed by mixing behaviors because it is more flexible and easier to maintain in practice.

Dependency injection is the paradigm of choice when organizing dependencies between objects. If a class has multiple dependencies (that is, a view controller needs table view delegate and data source, a repository, and so on) these objects can be passed in a designated class construction method. Similarly, the dependency is where possible an object implementing a protocol rather than directly referencing the class of the dependency, making the API decoupled and extensible.

Dependency injection beats inversion of control, which in turn helps the API to achieve the following items:

- ▶ Decoupling the execution of a task from implementation
- ▶ Focusing modules on the task they are designed for
- ▶ Freeing modules from assumptions about how other systems work, instead relying on contracts
- ▶ Prevention of side effects

The API aims to be intuitive for developers, and adheres to the following guidelines:

- ▶ Publishing one and one only way of achieving a task
- ▶ Exposing an architecture that is preconfigured for a default case that is usable “out of the box”
- ▶ Enabling the developer to achieve full control by controlled injection of custom logic

## 4.2.2 iOS SDK

The iOS SDK is designed as though it is an integral part of the platform. Coding standards and design decisions are selected to create an API which follows Apple’s guidelines.

The Core and UI libraries are available as dynamic frameworks, which the developer guide explains how to integrate into new projects.

The frameworks are available separately for device and for simulator to enable integration with limited bloat.

Developer Reference Guides are built in Appledoc, and integrate directly in to Xcode.

The SDK makes extensive use of `NSAssert` to verify preconditions in public and private methods. The SDK aims to “fail early” with clear error messages that clarify the API contract and enable a 3rd-party developer to debug issues without having access to the library source code.

### 4.2.3 Android SDK

The Android SDK is designed to be familiar for users of third-party frameworks on the platform. Coding standards following community guidelines.

The Core and UI frameworks are available as JAR files, because Java compiles into bytecode the libraries function for both emulator and device.

Developer Reference Guides are built in Javadoc and integrate directly into the relevant IDE.

### 4.2.4 Platform support

The ECM mobile SDKs contain native support for iOS and Android platforms.

The ECM mobile SDKs support hybrid platform that can contain import of native library files (Frameworks for iOS and JAR files for Java).

For example, the IBM MobileFirst Platform (renamed from IBM Worklight® in 2014) supports native integration from V7.0.

### 4.2.5 Sample code

You can download the source code of the examples described in this chapter from the following website:

- ▶ iOS app:

<https://github.com/ibm-ecm/ibm-ecm-redpaper-sample-app-ios>

- ▶ Android app:

<https://github.com/ibm-ecm/ibm-ecm-redpaper-sample-app-android>

## 4.3 Using Case Manager and Datacap to build composite solutions

As part of an enterprise deployment and the development of complete solutions to meet the complete needs of a business process, the need exists to be able to join the functions provided by Datacap to the functions provided by IBM Case Manager. Content is captured and indexed within Datacap and released to the repository. When the document objects are exported, it is simply content in the repository and will need to be associated with the appropriate case.

Case Manager can be configured to create the case automatically upon the receipt of a specified document class. This is one method of creating cases. This does not resolve the issue of filing any supporting or trailing documents into the case. Particular care is taken to ensure that the Case Manager and Datacap SDKs can be used in a composite manner.

These libraries are compatibility in a loosely coupled manner (for example, there is a Datacap document and a Case Manager document object, which exist inside separate namespaces). The suggested approach is to pass unique case identifiers between the two libraries as string objects.

Customers generally use the powerful functionality of the different libraries by using Datacap captured documents to do these tasks:

- ▶ Create a new case.
- ▶ Augment an existing case.

Integration is normally performed on the server side, as opposed to on the mobile client, by using the unique case identifier as an integration mechanism.

This section covers the filing of documents into the appropriate case and considerations in creating cases.

### 4.3.1 Relating incoming documents to the proper case

When a document arrives in the repository, you want to determine which case it belongs to. This involves creating a subscription of when the document arrives in the repository and the associated workflow to determine which case or cases the document belongs to.

#### Relating documents to cases

A workflow can be created to determine which case and arriving document will be filed in. A workflow is defined for each type of case and associated with the appropriate document classes to control the filing for each case type. The purpose of this workflow is to examine the document properties and compare it to the case properties of existing cases to find the case that the document belongs to.

This example provides a simple, yet common, approach to determining which case an arriving document should be filed in and what to do when that case cannot be found. The triggering document is associated with an attachment workflow property. The mapping of the subscription will automatically assign document properties to the mapped workflow properties when the defined subscription is executed.

Figure 4-1 outlines the workflow map followed in determining which Case the arriving document belongs to.

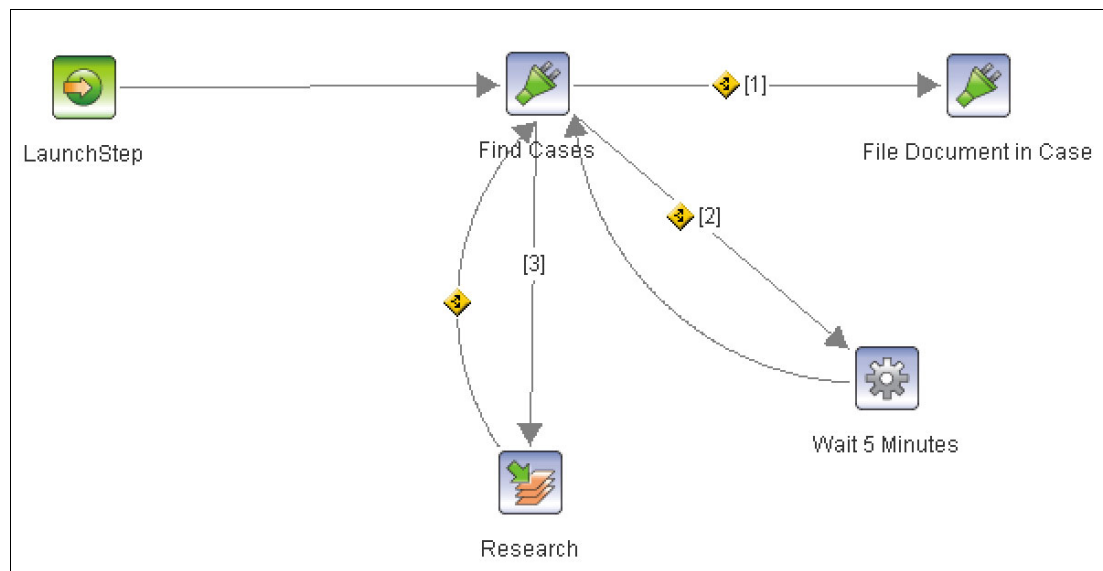


Figure 4-1 Document filing workflow

The following Data Field workflow properties are defined:

- ▶ ApplicationID: This string property contains the Case unique identifier and is mapped to the Application ID property of the incoming document.



- ▶ `alreadyWaited`: This Boolean property indicates whether a delay was already applied waiting for the case to be created.
- ▶ `CaseID`: This string property holds the GUID of the Case that the document is to be filed in.

The following Attachments workflow properties are defined:

- ▶ `ArrivingDoc`: This attachment array contains the document that launched the workflow and is marked as the initiating attachment.
- ▶ `TheSearch`: This attachment contains the value of the search that will be executed to find the matching cases. The search template is contained within the value of this field at development time.
- ▶ `Results`: This attachment array is used to hold the results of the search.
- ▶ `FiledLocation`: This attachment is used to hold the folder in which the document is to be filed in.

When the workflow is launched, and the document properties are applied to the workflow properties, it begins processing. The first step of the process is to execute a Component step that runs the `searchForMany` function from the `CE_Operations` component. This function executes the attached search template or stored search that will search for Cases that match the appropriate properties of the arriving document. Because Cases are a subclass of the `Folder` class, the standard `Folder` `objectType` can be used in conducting the search.

For our example, the search uses the `Application ID` property of the arriving document to search for cases that match that `Application ID`. The result is assigned to an attachment array that contains the `Case Folders` that are returned as a match. The number of folders returned is then evaluated by routing to one of the following steps:

- ▶ If the number of cases returned from the search is 1, then route to the `File Document in Case` step.
- ▶ If the value of `alreadyWaited` is false and the number of cases returned is 0, then route to the `Wait 5 Minutes` step.
- ▶ Otherwise, route to the `Research` step.

The steps are as follows:

- ▶ The *Wait 5 Minutes* step delays the workflow for 5 minutes in the instance where a document that initiates the case might have arrived after the current document and the case had not yet been created. This system step provides a five-minute delay, sets the `already-Waited` property to a value of true and routes back to the `Find Cases` step.
- ▶ The *Research* step provides an activity step where a user is required to determine which Case the arriving document should be filed in manually. The user must be able to update the workflow properties and either route the workflow back to the `Find Cases` step or cancel the workflow.
- ▶ The *File Document in Case* step is a Component step that executes two functions to file the attached document into the appropriate Case. The `getDocumentId` function of the `CE_Operations` Component is used to get the GUID of the Case that the document is to be filed in. Then the `fileAttachmentsToCurrentCase` function from the `ICM_Operations` Component is executed to file the document into the Case.

After a document is filed in a case, the Case tasks then can be used to determine what specific actions or impact that the document will have within the Case. This allows the document to be used in multiple Cases and the Cases each can manage how to use the document.

This simple example is of the steps that can be used to determine which Cases a document can be filed in. More complex criteria and properties can be used based on the various document properties to determine which Case it belongs to. In many cases, the property that uniquely identifies the Case, Application ID in the example, is not available on the arriving documents. In these instances, other properties might be used together to find the Case. For example, the address, application name, or Loan Number can also be used to find the Case.

### Document arrival events

To be able to react to the arrival of a new document into the repository and execute a workflow to determine which case the document might belong to, creating a workflow subscription is necessary. This is done through the Administration Console for Content Platform Engine interface. A new subscription is created by using the following guidelines:

- ▶ For a document class type, select the document class needed to trigger the subscription.
- ▶ Select the Create workflow subscription option.
- ▶ Select the Creation Event as the trigger
- ▶ Select the workflow definition that will be triggered
- ▶ Map document properties to workflow properties.

Figure 4-2 displays the summary panel for the subscription as it should appear.

<input type="button" value=" &lt; Back"/> <input type="button" value=" Next &gt;"/> <input type="button" value=" Finish"/> <input type="button" value=" Cancel"/>	
<b>Summary</b>	
Name	Value
Display name	CRE Document Arrival
Description	CRE Document Arrival
Class type	Document
Class	Supporting Document
Scope	Applies to all objects of this class
Workflow subscription option	True
Thumbnail generation option	False
Video transcription option	False
Workflow definition	CRE Document Arrival
Version	5
Isolated Region	1
Manual launching	False
Initial state	True
Subclass option	False
Subscription run mode	False
Triggers	Creation Event
Property map	ApplicationID = CRE1_ApplicationID LoanNumber = CRE1_LoanNumber

Figure 4-2 New subscription summary

This subscription, after configured, will trigger the workflow that is used to determine which case documents of the triggering class will be filed in when they are added to the repository.

**Important:** A subscription does not have to be defined for document classes that are set as the starting document type of a case. These documents will automatically be created and be filed in a case.

### 4.3.2 Considerations in creating a case

In our example, the arrival of an Initial Application will trigger the creation of a case based on the settings that were applied in Case Builder. In many business processes, no single document can be identified to trigger the initiation of the Case. A more common situation is that multiple instances of the triggering document might arrive and must be filed in the same Case. For example, in many loan processes, multiple Initial Applications can arrive in cases where information changes or the applicant forgets a signature. We would not want multiple cases to be created. To accomplish this, include the Case creation actions in a workflow similar to the one that is shown in 4.3.1, “Relating incoming documents to the proper case” on page 50 for the filing of documents in existing cases.

The changes to the workflow accommodate the instances where a matching Case does not exist but one must be created.

### 4.3.3 Typical business problems that are solved by Case and Datacap together

One of the challenges faced by businesses with the increasingly mobile workforce is being able to ensure that the correct content gets to the correct person at the correct time. In looking at this challenge, a critical task is to recognize that content is more than just the document or image of the document, it is also the data that is associated or found within the document.

Datacap Mobile provides the mobile user with the ability to process the content and capture it while on site. To make that content useful, the ability to separate, index, and use OCR on the documents while “on the go” allows documents to arrive in the repository complete without any additional processing required before it can be immediately used.

The person capturing the content is in the best position to be able to accurately and completely identify and index the documents. This will dramatically improve the accuracy of the incoming content by allowing the person who can most accurately provide the information to do so at the point of capture. The addition of OCR and automated identification extends manually provided indexing information making the arriving content as accurate as possible.

With Datacap Mobile extending IBM Datacap capture platform, organizations are able to provide a single capture platform regardless of the method that the content arrives. Organizations are able to apply a consistent process for capturing content from multiple arrival methods. Common methods of content arrival are as follows:

- ▶ Paper
- ▶ Fax
- ▶ eMail
- ▶ Electronic delivery
- ▶ Mobile device
- ▶ Upload

With Datacap, each arrival format can follow the same process and have all of the necessary automatic and manual processing occur in a consistent manner.

Organizations perform common actions on the arriving content to enable the use of the content within the repository. One example of this is performing a complete OCR on all arriving content so that full text searching can be made available to the users. Performing these actions also allows downstream applications and processes to remain completely independent of the way that the content arrives.

The arrival and commitment of content to the IBM repository allows the organization to execute any necessary actions that are related to the arrival of the content. With complete information about the content, better decisions can be made automatically. A fully indexed document content allows more efficient Case creation and determination of which cases the incoming content should be filed in.

A common problem faced by businesses is the associating of content with Cases that are in process. Many times a process must be placed “on hold” awaiting for the arrival of trailing documents to complete a task within the process. In our use case, this is when a Property Inspector goes to the property for inspection to takes photographs of the property and submit them directly to the Case.

Using Datacap together with IBM Case Manager allows an organization to develop their business processes without a dependency on how the content is captured. The consistency applied by Datacap allows an organization to develop their processes in IBM Case Manager without being limited or hindered by the method by which content arrives. Content can arrive from any location and immediately be associated with the proper Cases.

The following common business problems can be solved by Datacap and Case Manager working together:

- ▶ Creating cases in Case Manager
- ▶ Applying documents to the correct cases
- ▶ Tasks pended for document arrival
- ▶ Trailing documents
- ▶ Documents belonging to multiple cases
- ▶ Researching documents that were not correctly indexed
- ▶ Document validation
- ▶ Document source independence

# Related publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this paper.

## IBM Redbooks

The following IBM Redbooks publications provide additional information about the topic in this document. Note that some publications referenced in this list might be available in softcopy only.

- ▶ *Advanced Case Management with IBM Case Manager*, SG24-7929
- ▶ *Customizing and Extending IBM Content Navigator*, SG24-8055
- ▶ *Implementing Document Imaging and Capture Solutions with IBM Datacap*, SG24-7969

You can search for, view, download or order these documents and other Redbooks, Redpapers, Web Docs, draft and additional materials, at the following website:

[ibm.com/redbooks](http://ibm.com/redbooks)

## Online resources

These websites are also relevant as further information sources:

- ▶ IBM Enterprise content management  
<http://www.ibm.com/software/products/en/category/enterprise-content-management>
- ▶ Advanced case management  
<http://www.ibm.com/software/products/en/category/advanced-case-management>
- ▶ IBM Content Navigator  
<http://www.ibm.com/software/products/en/content-navigator>
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- ▶ iOS Security  
[http://images.apple.com/business/docs/iOS\\_Security\\_Guide.pdf](http://images.apple.com/business/docs/iOS_Security_Guide.pdf)
- ▶ iOS Deployment Overview for Enterprise  
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- ▶ Device Administration  
<http://developer.android.com/guide/topics/admin/device-admin.html>

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