



## Web Services or Native Client for Enterprise Mobile Application Development?

*A Comparison of SAP Fiori and RFgen Mobile  
Foundations for SAP*

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## Introduction

As businesses seek to leverage the full value of the Internet of Things and cloud computing, they need to develop or purchase business process applications that extend ERP system data to mobile devices throughout the enterprise. For a number of years, debate has raged within the application developer community about the best way to develop mobile applications for reliable performance, good scalability, and a superior user experience.

Mobile applications can be developed using 'web services' to operate in a web browser or an app can be developed to run as a 'native client' on an individual type of mobile device and mobile operating system. Developers can also adopt a 'hybrid' approach, which enables a web app to leverage some native device features through APIs. For companies using SAP Software, the SAP Fiori mobile application environment offers a hybrid approach to development. Mobile application development suites, such as RFgen Mobile Foundations for SAP, offer a native client development approach with the added advantage of delivering many prebuilt enterprise mobile apps out of the box, saving development time and costs.

This paper hopes to alleviate some of the confusion for management in operational areas of businesses running SAP. First, we'll define the differences in these three development approaches and take a look at what approach works best in different application environments. We'll focus on application development for high transaction, mobile data collection in industrial environments such as inside the warehouse or manufacturing plants, or out in the field. Next, we'll consider key considerations that are critical for mobile data collection in industrial environments. Finally, we'll drill-down to highlight the differences between two specific mobile development solutions: RFgen Mobile Foundations for SAP and SAP Fiori.

*Mobile applications can be developed using a web services, native client or hybrid approach.*

## Web Services vs. Native Client—What Are the Differences?

A mobile application developed with **web services** is essentially a responsive HTML5 website, rendered on a mobile device. The functionality is limited to the types of tools you see incorporated on websites today—though admittedly, these tools have been growing in sophistication over time. When you develop with web services, you can program the application only once and it can be used across mobile devices, regardless of which mobile operating system each device is running. Web services are developed using common programming languages and tools, which help lower development costs.

The downside of web services development comes in user experience. Browser-based apps may render differently on different devices and in different browsers. Web services cannot access native APIs, so their functionality is more limited. Most importantly, web services are running over standard http or https protocols. That means if connectivity is lost, any data you were transmitting through the application will be lost. When used in a high-volume transaction environment, this “send and pray” protocol is not a reliable method of collecting enterprise data.

**Native client** applications are written specifically for the mobile operating system(s) of the device(s) that will run them. This allows native client applications to access device native APIs and deliver a superior user experience. Native apps offer the ability to work offline or with intermittent connectivity and can be developed for ruggedized warehouse devices in addition to more common office devices such as smartphones and tablets. They can support real-time transactions with the ERP and other business systems and leverage all of the device’s features with a rich user interface. The downside to native client development is that you have to code the application for each mobile operating system that your devices will use (iOS, Windows Mobile, Android) and that means a longer development timeframe and greater cost. Native client development also requires more specialized developer skills. Finally, the application will have to be retested (and possibly updated) every time the device OS is updated.

There is also one more development option. **Hybrid** applications, as the name implies, are built with a mixture of the web services and native client development approaches, in an attempt to take advantage of the best aspects of both. Usually, a hybrid application involves an HTML5 web services wrapper coded around native client features, allowing developers to tap into some of the device specific functionality, such as GPS or the camera. The result is better functionality, but with a higher development and maintenance cost.

## Comparison of Web Services, Native Client and Hybrid Mobile Application Development

	Web Services	Native Client	Hybrid Approach
Development Language	Web only – HTML5, CSS3 or JavaScript	Native only – Platform-specific APIs and software development kits (SDK)	Native and Web – HTML5, CSS3 or JavaScript wrapper around some native APIs.
Use of Device-Specific Functionality	No. Access to the app is through the web browser and cannot leverage native APIs.	Yes. Native client apps are designed to leverage the features of a specific device and mobile OS.	Perhaps. A hybrid approach allows developers to access some common native device functions, such as GPS or cameras, but this feature set will be more limited than native client would allow.
Performance <sup>1</sup>	Low. Applications use browser cache and are not well-designed to interact with high performance databases or heavy transaction loads.	High. Applications that use high performance databases and process high volumes of transactions are best served by native development.	Low to Medium.
Speed of Development <sup>2</sup>	Rapid. Develop an application once and use it across devices and platforms.	Slower. Each application must be developed for every platform it will be used on. However, pre-built suites of native mobile apps can greatly speed development.	Fairly rapid. Hybrid apps do still require device-specific customization.
Development Costs <sup>3</sup>	Low. Web services development uses commonly-held skills and languages.	Medium to high. Native client requires more development skills, but costs may be contained by exploring pre-written solutions.	Low to medium.

1 Intermec  
2 Unidev  
3 Unidev

	Web Services	Native Client	Hybrid Approach
Network Access <sup>4</sup>	Connectivity is required. A web app can't run effectively in offline mode. If it's a data collection app, then any loss of connectivity results in the loss of data being sent to other systems, such as the ERP.	Offline use is supported. If the application will be used in an environment that is offline or where connectivity is sometimes unavailable, native apps are best suited for storing information at the device level.	Hybrid apps still transmit data via http protocol, so enterprise data collection requires the user to "send and pray" that data makes it to the back-office database.
Cross Platform Support <sup>5</sup>	Yes. The application is accessed through the web browser, so it works across platforms.	No. The application must be redeveloped for each new operating system. Pre-built application suites can offer businesses enterprise-level apps already developed for multiple mobile operating systems.	Perhaps. The web services portion will work across platforms, but the native client code may need updates when different device types are adopted or when operating systems are updated.
User Interface and User Experience	Average. The user experience is essentially the same as using any website.	Excellent. Each application is designed to create high usability and a rich customer experience because it was developed to leverage the best of the capabilities offered by each platform or device.	Above average. Hybrid apps can offer some of the device-specific functionality, but speed can be sporadic and the interface is less robust.
Maintenance Requirements	Low to Medium. Updates to the mobile operating system should not impact the operability of the web services app, unless the update breaks the web browser.	High. Anytime the operating system of one of your devices is updated, the native client mobile app will need to be retested and possibly updated.	Medium to High. The browser-based part of the app will not need maintenance, but some of the device-specific functionality will need to be tested when OS updates occur.

4 Intermed by Honeywell, "Does HTML5 Make Sense for Enterprise Mobile Applications," white paper, 2013.  
 5 Intermed by Honeywell, "Does HTML5 Make Sense for Enterprise Mobile Applications," white paper, 2013.

## Key Considerations for Industrial Enterprise Mobile Application Development

The truth is that there is no one right solution for enterprise mobile application development. In some environments, for some types of tasks, a web services application will work best. In other use cases, it may be critical to develop the app as native client. So how should you choose your development approach? RFGen recommends that IT leaders gather with operational stakeholders to answer these seven questions while planning for the development (or purchase) of new mobile enterprise apps:

### 1. How important is performance?<sup>6</sup>

Native client applications usually run fastest because the code is running closer to the hardware without the browser as an intermediary.<sup>7</sup> This could be important for applications with a heavy volume of operations, such as warehouse inventory transactions. Industrial applications may need to interact with the ERP database in real or near-real time, and avoiding any latency with browsers could be an advantage.

### 2. Which devices are you targeting?<sup>8</sup>

The type(s) of devices that will use the new app(s) can make a big difference in which development method is chosen. For example, if the app will be used primarily by smartphones in a well-connected environment, such as the front office, a web services or hybrid approach can save the expense of having to program for the different mobile operating systems (iOS, Android, Windows Mobile).

If your organization will use the app on only one type of device or a single mobile platform, your employees will benefit from a much richer feature set by adopting native client development. Additionally, many ruggedized devices, such as those used in the warehouse, route sales or field service, aren't ready for HTML5 development and would be better served by native client.

According to an Intermec by Honeywell white paper, companies should be aware that "Android and iOS are better suited to hybrid application development than is Windows Mobile— simply due to the lack of Windows Mobile support from the hybrid app tool vendors. Hardware vendors are beginning to address this lack of support for Windows Mobile, but those efforts are often limited to specific tools and/or to the vendor's hardware."<sup>9</sup>

6-8 Ben Rossi, "6 questions to ask when deciding between native vs web apps," Information Age, January 16, 2016.

9 Intermec by Honeywell, "Does HTML5 Make Sense for Enterprise Mobile Applications," white paper, 2013.

### 3. How critical is user experience to operational productivity?

Some applications require a richer user interface than others. With web services, you develop the app once and it is used in different web browsers across different mobile platforms. The result is that the app's interface may render differently on different devices. In native client, you can develop apps to render in the most usable way on each device. For example, if the app will be used to help warehouse or production employees step through a particular transaction, you can tailor the user interface to present the steps in the same order on every device.

### 4. How connected is your environment?

If you're deploying web services or hybrid applications, they will only work (or will perform best) in places with continuous, reliable connectivity to the Internet. Consider the environment(s) in which your employees will use the new mobile apps: What is the quality of connectivity in those areas? For a front-office application, connectivity shouldn't be a problem and web services or hybrid may work fine. But in more industrial environments, connectivity may not be as continuous. Are there parts of your operations (outdoor storage, remote warehouses, freezers, or underground) where connectivity will be unavailable for long periods of time? If so, native client is the best solution.

### 5. What does the offline data for your app look like?<sup>10</sup>

If you are considering using a hybrid or web approach to mobile development in an offline environment, you need to consider the amount of data that would need to be stored at the device level. If the app is very simple, with low data requirements that can be cached at the browser level, then web services development would be possible. In apps developed with web services, all logic resides on the web server. If you lose connectivity, you lose data. Therefore, any applications that need access to high performance databases and need to be able to run in an offline mode as well should be developed with native client.

<sup>10</sup> Ben Rossi, "6 questions to ask when deciding between native vs web apps," Information Age, January 16, 2016.



## 6. Are your workflows different in different locations?

When using a web services approach, the app will work the same across all devices, browsers, and parts of the company. That's the nature of creating a web browser based app. If you needed to create a different workflow within the application, it would probably require the complete duplication of the web app and reworking of the application's logic.

With a native client approach, you can customize the logic in a mobile app to reflect special workflows. For example, if one warehouse location uses FIFO picking but another warehouse uses a different method, you can accommodate that with native client. If one plant uses a different order for some of the production steps in a workflow, you can code that into a native client app.

Even with hybrid apps, the ability to create and manage multiple, customized workflows is really complex. In many use cases, it would require the same amount of rework as the web approach.

## 7. How many development resources do you have?

If you believe that your enterprise mobile application needs would be equally served by a web approach as by a native client approach, then your development time and expense would typically be lower with web services. But that's not a reason to force a web services approach on a use case that's better suited by native client.

Gartner predicts that by the end of 2017, market demand for mobile app development will grow five times faster than internal IT organizations' capacity to deliver development services.<sup>11</sup> This implies that IT organizations will have to find more ways to leverage external development resources. In the case of mobile data collection applications for enterprise use, it might be wiser to look for a package of pre-written native client solutions that you can quickly customize to your organization's workflows.

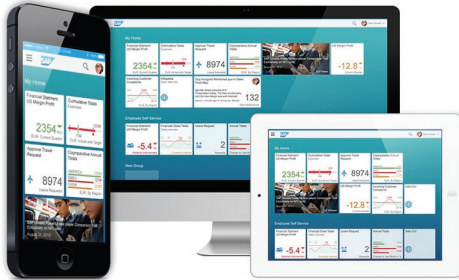
Answering these questions should help you more easily determine the best development path for new enterprise mobile applications.

<sup>11</sup> Gartner press release, "Gartner Says Demand for Enterprise Mobile Apps Will Outstrip Available Development Capacity by Five to One," June 16, 2015.

## Comparison of RFgen Mobile Foundations for SAP vs. SAP Fiori

Let's take a look at a real-world example for SAP enterprise mobile data collection. What are the operational differences, development constraints, and user experience comparisons between a Mobile Development Framework using native client technology—RFgen Mobile Foundations for SAP—and the hybrid mobile applications offered with SAP Fiori?

### SAP Fiori: Hybrid Web Services



According to the SAP website, “SAP Fiori is the new user experience (UX) for SAP Software. It applies modern design principles for a completely reimagined user experience. SAP Fiori UX represents a personalized, responsive and simple user experience across devices and deployment options.” SAP Fiori is

meant to provide a mobile user experience for enterprise employees—as such, applications can be used across desktops, tablets and smartphones.

SAP Fiori UX offers prebuilt apps that enable employees to monitor real-time business information and complete some common tasks, according to each user's business role. For example, apps for the “Cash Manager” role include: real-time access to bank statements, cash flow and payment statistics, liquidity and cash flow analysis, etc. Transactional apps allow the cash manager to make bank transfers and approve payments.<sup>12</sup>

Since we're more interested in industrial mobile data collection, let's examine SAP Fiori UX for Supply Chain. The “Warehouse Manager” role includes apps designed to “Provide real-time insight into operational performance in the area of inbound and warehouse internal related process related to inbound deliveries.”<sup>13</sup> KPIs enable the warehouse manager to see real-time information about outbound deliveries, by number, weight and volume. The warehouse manager can also monitor metrics about overdue outbound deliveries and the average goods issue delay time.

These apps are not really designed to send employees into the warehouse with mobile barcode scanners to do things like receive and put-away inventory, issue materials to a production order, or pick items for a sales order. Industrial apps such as those would need to be developed in house using the SAP Fiori Mobile development platform (previously referred to as SAP Mobile Platform, or SMP).

*SAP Fiori is meant to provide a mobile user experience for enterprise employees—as such, applications can be used across desktops, tablets and smartphones.*

12 SAP presentation, “SAP Fiori UX App Overviews,” December 2014, slide 8.  
13 SAP presentation, “SAP Fiori UX App Overviews,” December 2014, slide 138.

SAP Fiori is included with SAP at no additional charge. However, there are some costs associated with SAP Fiori. Whether you're using the SAP Fiori UX prebuilt apps or developing your own apps with SMP, your organization will be required to run the latest version of SAP and also to adopt the SAP HANA database. Transactional apps have individual requirements for backend support in order to function properly. Updates and patches may be needed, and without them, the apps may cease to function properly.

SAP Fiori bridges the gap between desktop and mobile devices, providing a consistent user interface and experience.<sup>14</sup> You cannot develop for offline use cases unless you are developing with SAP Fiori Mobile. Because SAP Fiori employs a hybrid development approach, you can access some native device features not normally exposed to web applications, such as camera access and voice recording.

### RFgen: Native Client



RFgen Mobile Foundations for SAP is a suite of more than 50 pre-written, SAP-validated data collection solutions that feature real-time, bi-directional information exchange with your SAP system. It's designed for operational efficiency within heavy-volume transactional environments. RFgen pre-written solutions include transactions such

as PO receiving, directed put-away, inventory transfers, cycle counts, issue to production or sales order, and other day-to-day workhorse transactions that power an industrial operation.

RFgen's solutions can be easily customized to match your company's specific workflows, and are designed for use on industrial mobile devices like barcode scanners and ruggedized tablets as well as consumer grade devices like smartphones and tablets. It supports real-time voice integration, wireless barcoding, and change to mobile/disconnected applications.

<sup>14</sup> Sarah Lottman, "Fiori is Free – Now what?" SAP Community Network, July 23, 2014.

The RFgen mobile clients utilize the same code base and runtime engine regardless of the mobile OS you're developing for. However, unlike traditional native client solutions, The RFgen Mobile Development Framework removes the complexity from application development for multiple devices and OS platforms. Regardless of the device or operating system (Android, iOS, Windows Mobile) RFgen provides ready to run, certified native clients that will provide your users with a proven, high performance, and state-of-the-art user experience.

Further, RFgen provides an integrated development environment (IDE) that enables your internal IT staff to rapidly customize existing workflows and to create entirely new applications in a fraction of the time required using other technologies.

For example, workflows only need to be created once (using a drag and drop form designer), after that they can be quickly and easily configured with endless variations of language and screen sizes. Additionally, while applications can be fully developed with no coding, RFgen supports VB.Net and VBA scripting scenarios while providing a wealth of built-in capabilities to enable developers to quickly and easily handle the most demanding mobile application requirements.

If your mobility requirements include the need to leverage the native capabilities of any device using Windows, Windows Mobile, iOS, and Android mobile platforms, RFgen makes accessing these features easy. This includes items like (but is not limited to) barcode scanners, ring scanners, RFID, cameras, GPS, geo-location information, signature capture, Bluetooth, etc. Further, RFgen also provides the ability to integrate other devices into your applications including weight scales, carousels, fixed station RFID and barcode scanners, and PLC devices.

RFgen also helps businesses automate remote warehouses and field operations with built-in support for roaming, occasionally-connected data collection using on-demand cellular/Wi-Fi connectivity to SAP. It also supports fully disconnected scenarios where data is pre-loaded on the device, remote activities are locally validated, and transactions are exchanged with SAP at various intervals.

RFgen integration is certified by SAP for versions 4.6c to 6.05 and SAP HANA, it does not install on your SAP server, and it's version independent, so there is no hassle when it's time to upgrade SAP.

*If your mobility requirements include the need to leverage the native capabilities of any device using Windows, Windows Mobile, iOS, and Android mobile platforms, RFgen makes accessing these features easy.*

## Conclusion

There are many important factors to consider when debating whether to develop enterprise mobile applications as native client, web service, or hybrid. Generally, native client apps run faster, deliver a better user experience, and offer a richer feature set. Web services offers cross-platform operability by rendering as a website to simplify development and (hopefully) lower costs. A hybrid approach provides some native client functionality, wrapped in the web browser interface.

In order to decide how to approach development for mobile applications in your enterprise, it's important to establish how the app should perform, on what devices you will deploy it, and in what environments it will be used. For front-office use cases, where connectivity is constant and transaction volume is less demanding, a hybrid approach to application development like that offered by SAP Fiori can deliver a good suite of mobile applications.

In high-volume, industrial enterprise use cases, such as the conditions found in the warehouse or manufacturing operations, native client is the better development approach. Luckily, industrial enterprises can still lower development costs and speed mobile app deployment by leveraging a mobile development framework that provides certified, native client mobile apps developed for their specific mobile devices and ERP system.

For SAP customers, RFgen Mobile Foundations for SAP delivers more than 50 ready-to-use, SAP-certified mobile applications that help industrial businesses optimize inventory management, warehouse management, manufacturing, plant maintenance, and supply chain management. This suite of pre-written, customizable apps, along with the RFgen Mobile Framework, can help organizations expediently develop and deliver native client mobile solutions to the enterprise using minimal internal development resources.

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## RFgen Software—The Mobile Data Collection Experts

RFgen Software helps organizations reduce supply chain implementation costs and increase accuracy and efficiency with the industry's most reliable and flexible wireless and mobile automated data collection (ADC) software and open source supply chain solutions.

In business since 1983, RFgen is known in the manufacturing and distribution industry for its solid, high-quality products and high customer satisfaction ratings among its more than 2,800 customers. With a global reach and local touch, RFgen and its network of more than 140 certified solution partners can service and support your organization no matter where your operations are located around the world.

Using RFgen, businesses are able to quickly take their current manual processes and turn them into real-time mobile applications using barcoding, RFID, mobile and wearable technologies. RFgen's Mobile Foundation Suites accelerate the integration of mobile and barcoding technologies into your environment providing certified solutions that can simplify existing processes as well as combine multiple ERP operations into an optimized workflow.

Whether you are looking for solutions to automate your warehouse and better manage your inventory, comply with government regulations, ensure 24/7 warehouse operations, track and trace your products, voice-enable your warehouse, or manage your remote inventory, RFgen is the smart choice.

**To learn more, please call us at 888-426-2286, or visit our website at: [www.RFgen.com](http://www.RFgen.com).**

*Reduce supply chain implementation costs with RFgen Software—one of the industry's most reliable and flexible mobile and wireless automated data collection solutions on the market today.*

1101 Investment Blvd, Suite 250  
El Dorado Hills, CA 95762  
(888) 426-2286

[www.rfgen.com](http://www.rfgen.com)

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