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solutions in technology

What you should consider when searching for a mobile solution

We have built a lot of software over the years. This has required us to get under the hood and learn about the inner workings of our customers' business. We've worked for companies in distribution, manufacturing, depot service, field service, retail, and human resources. It's good to have crossed over these different sectors because it has enabled us to gain broad experience and also to recognize patterns in the kinds of challenges these customers deal with.

One area we are building expertise in is field service. The fundamental problem that field service companies face today is that they are still running their business with pen and paper. With technology advancing at an unprecedented rate, these business owners know that there has to be a better way. There is a wide variety of devices and software available, but how does one choose? What are the right questions to ask that will lead to the right solution?

In this document, we've attempted to provide a check list of all the various things to think about and questions to ask. We think we've covered the major items drawn from our experience. If there is anything you think we should add to the list, contact me at **kpatterson@kmpdesigns.com**.

The Checklist

- ☐ Choose Online or Offline Operation?
- ☐ Screen Resolution
- ☐ Signature Capture
- ☐ Speed and Capacity
- ☐ Barcode/RFID Scanning
- ☐ Network Connectivity
- ☐ Ruggedization
- ☐ Battery
- ☐ Accessories
- ☐ Software
- ☐ Level of Integration
- ☐ Remote Control
- ☐ Software as a Service (SAAS) or Site License?
- ☐ Spares Management
- ☐ Tablet, Notebook or Handheld

Choose Online or Offline Operation?

With all mobile field solutions, technicians will carry around some kind of device (tablet, notebook, or handheld) that replaces the paper clipboard. However, there are two kinds of architectures that are deployed with these kinds of solutions; online and offline.

An online solution is one that relies on Internet connectivity while data is being captured. Very often, the user interface is presented through a web browser on the device and the application is actually running on a server somewhere across the ether. The advantage of an online solution is that data being presented is usually 100% current (real-time) and deployment/updating of the application is simplified because only the centralized application need be updated. The disadvantage of the online solution is that if connectivity is not available 100% of the time, this may result in the technician having to use another means to record service until he can get a connection to perform the data entry.

An offline solution reads and writes to a database that is local to the device. The application is usually written for and run on the operating system of the device. This usually makes for a richer user experience and if properly written, these applications perform very quickly.

Offline systems usually provide a means of synchronizing the data captured in the local database with a central database. This synchronization can happen over a variety of connections; wireless 3G/4G Internet, Wi-Fi Internet, wired Internet connection, through a docking station, etc. Wireless 3G/4G is the most versatile as it will permit remote synchronizations throughout the work day. Synchronization can be either one-way or two-way. One way synchronization usually involves the transmission of captured data from the device to the central database. Two way synchronization permits information to flow both ways; device to central, central to device. Two way synchronization is required to support dispatching.

The advantage of offline solutions is that lack of Internet connectivity will not prevent capture of data. The local application is usually richer and faster. The disadvantage of offline solutions is that data on the device is only as current as the last synchronization. It is a more complex platform because of the need to support data synchronizations.

Finally, administration of the application is decentralized. In other words, when an update is required, the update must be performed on each individual device.

Screen Resolution

It is difficult not to be biased about this subject. There are a plethora of different opinions on what is the optimal screen resolution that should be supported. The answer depends on the application you are running. Let's look at the facts and then you can decide for yourself.

Small Resolution Devices

These devices usually fall under the handheld category. This might be a BlackBerry, a handheld PDA (think Symbol/Motorola, Psion Teklogix, Intermec, etc.), or a smart phone. Resolutions vary. These devices are absolutely wonderful for some applications and a nightmare for others. The small screen resolution becomes problematic under the following scenarios.

1. You have a large amount of information that must visible at once. There just isn't the room to see everything at once. Take a work order for example. If your work order has 10 fields in the header alone, along with lists of jobs and parts, and a space for various comments, it will not fit on one screen. Designers often resort to the use of tabs to subdivide the screen. Tabs like "Jobs", "Parts", and "Comments" make it possible to click to see that part of the form. The only problem is, when you click on a tab, the other information disappears. This leads to a lot of clicking to capture and review data.

2. You have to present long lists for looking up data. Again, it won't fit, so you have to resort to scrolling within the confines of a very small screen.

3. You need to be able to display two forms at once. It generally can't be done, meaning lots of clicking around. For example, in field service applications, there is usually a work order queue (which is a list of work orders in progress) and then an individual form related to an individual work order. It will be impossible to have simultaneous visibility of both.

Large Resolution Devices

These days, when I talk about large resolution I'm talking about at least 1024 x 768 pixels. Most tablets and notebooks today support at least this resolution. Compared to a modern BlackBerry with a resolution of 480 x 360 pixels, the 1024 x 768 is 4.5 times bigger, which means the capacity to present 4.5 times more information.

The reality is that in most cases, 4.5 times more information is not presented. Instead, with the effective use of white space and good user interface design, designers opt to present more information with less density and eye strain, making for a richer overall experience. For example, an entire work order can be presented without needing tabs or clicking. A technician can look at one screen and determine the level of completeness of his work; header, jobs, parts and comments. However, if you want the larger resolution, the device will be larger than the smaller resolution handheld device. This may or may not be a problem depending on the nature of the work you do.

Signature Capture

Often it is necessary to capture a signature onsite as proof of service. Traditionally this is done by having the customer sign the paper work order which contains the details of service. If this is a requirement, you'll want to make sure that you can capture signatures electronically on whatever solution you select. This can be accomplished a number of ways.

With a tablet PC, you merely have the customer sign the screen which at the same time can be displaying the work order with the details of service. A signature pad accessory can sometimes be attached to a notebook or tablet through a USB or a serial port and this will support signature capture provided the software is written to recognize the device and integrate the electronic signature. In the case of a PDA, most operating systems support a stylus (an electronic pen) for the capture of signatures. Most smart phones do not support signature capture.

Speed and Capacity

When we talk about speed, we are usually talking about the processor technology on the device. How fast the processor runs at can make a huge difference in how it performs in the field. There is such a wide variety of platforms and processors out there that it is difficult to know which is best. Most field service applications don't need a ton of processing power so in general it would be best to see the application performing on a particular device to gain a comfort level.

As far as capacity is concerned, here we are talking about drive space and RAM.

The larger the hard drive, the more can be stored on the device. This would have implications for how much historical data could be stored at a time. There are generally two kinds of hard drives these days: mechanical spindle hard disk drives (HDD) and solid state drives (SSD). The HDDs required a disk to spin at a high rate of speed to operate. Motion can cause these drives to crash or the heads to park, slowing down the device. SSDs are generally preferred for mobile applications. They have no moving parts and they are faster. They are also not volatile to magnetic fields like their HDD cousins.

Barcode and RFID

Barcode scanning is a convenient method of quickly identifying a part, piece of equipment, serial number, etc. It saves on data entry time and in general, depending on the symbology of the barcode, can increase accuracy. If barcodes are readily available on many of the parts and equipment that are being identified in your field service business, then it makes sense to get a device that has a built in barcode scanner. Most PDAs and tablets make it available as an option. Smart phones, in general, do not.

RFID is the next generation of barcode technology. It provides a means of identifying a part without line of site visibility of a symbol. It functions using radio frequency interaction with tags that emit a unique code. The jury is still out on RFID as a technology. Not everyone has embraced it yet. Again, most tablets and PDAs offer RFID as an option.

Network Connectivity

There are four popular methods for connecting a mobile device to a network or the Internet:

1. **Wired Ethernet Connection**
   If the device has an RJ45 jack on it, this will enable it to be plugged into a network directly, just like it was a desktop or notebook computer. This method is the most secure and often provides the greatest speed depending on the speed of the network being connected to. However, it offers very little mobility unless connecting to a mobile hub or access point.

2. **Wi-Fi Connection**
   This is a very portable and versatile option. Provided the device can be brought within range of a Wi-Fi hotspot that is accessible or open, without wires, a connection to the network or Internet is simple. Note though that the connections are available only in hotspots and be careful that you are not using ports or protocols that might be blocked on some of the hotspot networks you are connecting to.

3. **Broadband Connection**
   This is the most versatile option. Using a wireless service provider offering 3G/HSPA service, wireless access to the Internet can be gained from anywhere the service provider offers service. This is the absolute broadest and most portable option available. For Mobile field service, if this option is available for the device (often a broadband radio is installed into the device) talk to the software provider about recommending a plan (500MB/month, 1GB/month, etc.) that will work for their solution.

4. **Docking Station Connection**
   This is the slowest and cheapest of all the options. Usually the device must be docked to a computer which in turn must be connected to the network.

Ruggedization

For field service, some kind of ruggedized device is a really good idea, or choose a device that you can purchases a sturdy protective case for, like those offered by Urban Armor Gear.

The device should be able to withstand drops, shock, humidity, moisture, wide temperature variations, dust and dirt.

Battery

Your mobile device needs to be powered by a battery in order to be mobile. Here are four things to think about concerning the battery:

1. What is the battery life? In other words, once charged, how long will I be able to run the device before I have to recharge? What factors affect the battery life? For example, if I leave the broadband 3G radio turned on, does this affect my battery life?
2. Is the battery easily replaceable? You'll replace the battery if it dies and you have a spare, or if it just won't charge anymore (batteries can be defective like this and can often be replaced under warranty.)
3. If the battery hot-swappable? You are out in the field, the battery is about to die, you have a spare with you. Can you remove the battery that's dying and replace it with the spare without turning off the unit or closing the application?
4. Is there are an automobile charger option? Instead of letting the device run down, can you recharge between service locations. NOTE: Be careful with this. Most manufacturers recommend that you allow the battery to completely discharge at least once a month.

Accessories and Printers

When exploring what accessories can be attached to your device, this comes down to two bigger questions about interfaces and device drivers.

1. **Interfaces.** An interface defines the standard by which an accessory will be connected. The most popular interfaces today for mobile devices are USB (wired) and Bluetooth (wireless.) But just because the device supports these interfaces does not mean that it will support all devices that run on these interfaces. That will depend on the available drivers. Some mobile devices vendor make their own accessories (printers, card swipes.) These may use a slicker, proprietary interface that keeps the form factor small. In addition, they are guaranteed to work and are supported. Check with the vendor on what accessories are available.
2. **Device Drivers.** A device driver is the software piece that runs on a mobile device that enables the mobile device to communicate with the accessory on the other end. This is fairly important. Check with the mobile device vendor on the list of supported accessories.

Software

Is all of the software you need available on the device? Some examples to think about:

- Dispatching/Scheduling
- Work Order Management
- Equipment History
- Email
- Mapping/GPS
- Time Sheets
- Requisitions
- Office Productivity

REMEMBER: If the software vendor providing the solution is purely web-based and you need to have an internet connection in order to use the software (3G, Wi-Fi, wired) then be sure to understand the limitations of this. Ask a question like: Can I still capture work order data without a connection back to your server?

Level of Integration

Is the system completely integrated providing all of the functions needed across the field and office, or is there a line in the sand between the office systems and the field system?

Complete Integration

With a completely integrated solution, there is no need for an exchange of information between two systems. Work orders captured in the field flow right into invoicing which flow into receivables. You also have a single point of contact for support. In order to deploy this kind of solution, you need to migrate from your existing accounting/management system, to the replacement system.

Limited Integration

Sometimes the field service solution stands by itself and some kind of exchange mechanism is supported to move work orders over to invoicing in a separate system. This may be a reporting mechanism where the data still needs to be data entered. It may be that the invoice import standard of the accounting system is supported and files in that format are produced for consumption. Check with the vendor and understand how the exchange works.

Remote Control

If a technician has a problem out in the field, how will they be supported? Is there a means by which the device they are working on can be remotely controlled?

Software as a Service (SAAS) or Site License?

SAAS

Some vendors offer solutions that are available as Software as a Service or SAAS. This means that they will provide all of the server infrastructure and application hosting so you will not have to invest in this technology. It is an attractive option for small and medium sized businesses that do not have a significant server infrastructure or IT department, because someone else looks after this for you. It is also attractive to larger organizations that do not want to have to involve their IT department. Usually SAAS appeals to organizations where there are less than 10 users in the office.

With this model, access to the software is paid for monthly, usually per user/technician per month.

Site License

Choose a site license when it is important to install and manage your own servers and when there are office users in excess of 10. A site license will make integration with local software and devices easier but it will require maintenance through an internal IT department or an outsourced provider.

With this model, a site license is paid up front and you'll purchase deployment services (migration, infrastructure, software development, training, etc.) Then you'll pay an annual support and maintenance fee, typically 10-20 percent of the software license fee, per year.

NOTE: Vendors that offer both SAAS and Site License options often provide an upgrade path SAAS to Site License as your business and requirements grow.

Spares Management

If you are going to deploy a number of mobile devices to the field, you are going to want to make sure that if any of these devices cease to function that there is a backup plan. This is why it is a good idea to have a spares management program in place. When a unit fails, a good spares management program will get a replacement to the technician within 24 hours or less. Then the unit that failed is repaired and placed back into the spares pool. Make sure you enquire about whether this is available, how it works and what it costs. Think of it as insurance for continued operation in the event of failure.

Tablet, Notebook or Handheld?

So you want your technicians to carry an electronic device to replace paper. Which device should you choose? That depends on what you want to do with it. Below is a comparison grid of tablets, notebooks and handhelds.

	Tablet	Notebook	Handheld
Size	Medium	Medium to Large	Small
Portability	Moderate	Moderate	Good
Ruggedization	Available	Available from some vendors	Available
Screen Resolution	Good	Good to Excellent	Poor
Keyboard	As an accessory; sometimes	Yes	Sometimes a small keyboard; accessories available
Pen Entry	Yes	Optional	Sometimes
Signature Capture	Yes	Only as an accessory	Sometimes
Battery Life	Moderate to good	Moderate to Good	Good
Operating System	Varies	Varies	Varies
Software Availability	Excellent	Excellent	Moderate
Price	Most expensive	Least expensive (without ruggedization)	Medium expensive
Built-in 3G/4G Radio	Available	Available sometimes	Available
Built-in Barcode/RFID	Available	Not available	Available
Accessories	Available	Available	Available

For field service, whatever device is selected, the features that are generally desirable are: Ruggedized, sufficient battery for the work day (or mobile charging options), built-in 3G/4G radio. The remaining options depend on your requirements and preferences.

Conclusion

There is a lot to consider when choosing a technology solution. Use this paper as a guide to question vendors that supply these kinds of solutions. As well, you can contact me directly at kpatterson@kmpdesigns.com if you have any questions.