



## Technology trends forecast

Rugged mobile computing and data capture



**Spirit works at the forefront of the rugged mobile data capture industry. We continuously develop a full and exciting portfolio of products and services that are designed to provide you with a seamless solution from start to finish.**

**We are fully committed to maintaining our high level of expertise within the mobile technology industry. This will enable us to continue to provide you with practical advice and guidance on the solutions that are most suitable for your business.**

**We hope that this guide helps you to understand how you can benefit from using our data capture solutions. We would be delighted to help you to discover the powerful benefits that enterprise mobility can offer your company.**

### Complementary technologies

Mobile computing continues to incorporate complementary technologies that add product functionality and value. These include many different methods of identification for products, assets, people, etc.

This makes the capture, movement and management of information even easier than before.

### Commoditisation

Major manufacturers are encouraging the trend towards commoditising mobile computing and data capture technologies through mass distribution.

### High capacity barcodes

Barcodes have been used since 1952 as a simple and reliable method of identifying and tracking items. They remain popular due to their low cost and ease of implementation. The main types of barcodes include linear, multi-row, matrix and composite codes.

In recent years, the development of 'high-capacity' barcodes, which are capable of storing thousands of characters, has given this technology a further boost, with new applications such as biometrics. The trend towards the use of high capacity barcodes is therefore likely to continue.

### Barcode scanners/image capture

Barcode scanners have also developed beyond recognition. Many devices now use imagers and camera-style technology to capture an image and to decode any barcodes. Laser scanners will continue to be used in specific areas. However, imagers are now commonplace in many mobile devices, as they can support 1D and 2D barcodes, and can also capture low resolution images.

This is why they are now more widely adopted in the mobile computing sector and their popularity will continue to increase as their cost and performance continue to improve.

### 3D barcodes

These are much more versatile than traditional 2D or linear barcodes, which are usually printed on a label. 3D codes can be engraved or embossed onto individual products or components. They can even be used on small electronic components and are much harder to change or deface than 2D codes. 3D barcode scanning can be used in virtually all stages of the production process.

The key benefits of 3D barcodes include improved accuracy of

information, fewer errors and lower costs (due to more reliable information and more efficient processes).

### Camera and image applications

A colour camera now features in many rugged mobile computers and rugged PDAs. Some can take high resolution images and have a flash and auto focus capability, similar to a normal digital camera. Colour cameras can add value in many applications by providing additional information relating to an event. For example, in a proof of delivery application, the camera can be used to take a picture of a damaged package.

The high resolution images can be used within software applications to provide improved data capture methods, such as Optical Character Recognition (OCR), Automatic Number Plate Recognition (ANPR), document capture or even barcode scanning – thus maximising your investment. The camera technology will continue to improve, which in turn will allow more and more sophisticated applications to become available on the mobile platform

### Interactive sensor technology

This type of technology has been used in consumer phones and PDAs to allow the screen to switch orientation when tilted. This allows users to type emails or SMS messages in a more comfortable way. The technology has now been adopted for the rugged mobile market, where it allows software applications to take advantage of knowing the direction and orientation of the device. This information is then used to trigger an event. For example, if the device is dropped, it can trigger an alarm for the office to contact the field worker. If a device is left flat on a desk for a period, it can switch itself into a 'suspend' mode to preserve its battery life.

This is a relatively new technology within rugged mobile computing and will become more widespread when applications become integrated with the technology.

### RFID

RFID (Radio Frequency Identification) is a method of identifying products that uses radio waves to read the data. RFID tags have been available for many years. However, it is only recently, with the introduction of new standards and a reduction in the cost of the technology, that RFID is being adopted more widely.

The tags can be 'read only' or 'read and write'. Different standards allow tags to be read from varying distances, depending on the requirement.

There has been considerable media interest in RFID, as theoretically

'live' RFID tags can be used to track a consumer's movements and can transmit information to unwanted recipients.

One of the biggest potential markets is the retail sector; where it has become viable to incorporate a tag at the time of manufacture within mid- to high-priced products. It can then be tracked from 'cradle to grave'. This can be used for pricing and warranty information. Even at the end of the product's life, the tag can be used to incorporate data relating to recycling capabilities.

Public transport is already a significant user of RFID tags, which are incorporated into tickets and passes. Organisations use them in identification cards for access control. The healthcare sector will also continue to invest in RFID.

Automatic collection of road tolls is now widespread. Tags can be read from overhead and from roadside gantries.

RFID has been seen by many as the successor to barcodes, although it has taken 50 years to develop it fully! At the business level, it is likely to take years to implement an entire RFID system. ITWatch (the technology watchdog) predicts that it would take three to seven years for a supermarket chain to completely replace its data capture devices with RFID systems.

## Biometric identification

The security market has driven the development of biometric identification technologies to new heights. Finger scanners are now fast and accurate and can be integrated into small mobile computers. Facial recognition systems are reliable and can be implemented with simple video technology. Use of iris scanning will continue, but generally only in static locations.

## Different types of data media

The ability to read and / or write to different types of data media has become increasingly valuable to users, both large and small. Data-orientated media products include smart cards and portable solid state memory cards (SD, MMC, CF etc.). These are increasingly being used in the mobile computing market to allow storage of databases, GIS data, application programmes and collected data. The devices are becoming progressively smaller as the SD cards have decreased in size. However, the memory has increased, as Micro SD cards can now support up to 32GB.

## Wireless computing

This market continues to explode, due to a combination of wireless technology and mobile computing. Enterprise mobility brings improved customer service and reduces operating expenditure. Companies know that field workers need access to the same data as their office colleagues, and this is now easily achievable with mobile computers. Wireless mobile computing enables the use of email, wireless data transfer, Internet access, global positioning and voice communication.

All of these can be delivered via devices that range from handheld mobile computers and smartphones through to laptop computers, tablet computers and even desktop computers using VoIP (Voice over IP – i.e. 'soft' telephones on the PC). Wireless printing continues to be one of the most recent extensions of the benefits of wireless networking.

## Wireless Personal Area Network (WPAN)

This replaces cables as a technology for connecting devices. It can be used to link mobile computers, mobile phones and other portable devices together and to connect them to peripherals such as printers. Bluetooth is probably the best known example of WPAN.

## Wireless Local Area Network (WLAN)

This offers a similar performance to a typical wired network but without the wires! WLAN networks can be installed both inside and outside buildings. The network must comply with recognised networking standards (e.g. IEEE 802.11 a, b or g, also known as WiFi). Ideally, systems should not be proprietary and should promote total interoperability between products.

## Wireless Wide Area Network (WWAN)

This is used to connect remote workers, normally operating in a wider geographical area than WLAN (most often over mobile phone networks). A WWAN is enabled through 3G+, GPRS, Tetra or other private networks. In terms of costs, users don't normally pay for the network connection; instead, they pay for the number of packets of data transmitted. The cost depends on the amount of data being exchanged. However, they can also have a GSM subscription on a SIM card. This can then be used to transmit both data and voice to the end user if required. For GPRS and 3G+, the cost of transmitting data is becoming comparable to that across a dedicated land line. 'Data only' packages are available from network providers. The costs of hardware are now comparable to more traditional systems. WWAN utilisation therefore continues to grow as new uses are found. 3G+ coverage in the UK has grown rapidly

in recent years, but is not yet comprehensive. Most mobile devices and phones offer 3G+ data connection and GPRS as a fall-back, as it is available in almost any location in the UK.

#### 4G

4G (4th Generation mobile networking) technology aims to be similar to the wireless networks that are used in the workplace or at home, only on a much larger scale. It will be integrated into mobile devices as well as desktop solutions. For mobile users, it will provide an 'always on' mobile broadband connection (up to 1 Gbps data transfer speeds), so that voice calls, media streaming and Internet access will be constantly at hand. Although 4G is not yet available, companies are working hard to develop standardisations and to define it. It promises to be an incredibly exciting technology.

#### Location, location, location

Many remote workers are completely on their own. This raises numerous issues: for example, how can a service engineer be deployed most effectively if their location isn't accurately known? Health and safety can also be compromised if regular position and status reports aren't received from 'lone workers'.

These issues can be addressed by using GPS (Global Positioning System) to provide accurate location data. When used in conjunction with WWAN, the position can be constantly monitored for efficiency or safety purposes. When used in conjunction with GIS mapping data, the job scheduler can take the worker to the precise position (within a few metres) and then advise them of the work required. At a very basic level, 'lone workers' can have simple applications included that require them to respond to prompts at regular intervals to indicate that they are all right. Recent technological developments enable mobile devices to combine different tracking technologies to improve the accuracy and consistency of the tracking information.

#### Geo-fencing

A geo-fence is a virtual perimeter for a real geographical area. It can be dynamically generated or it could be a pre-defined set of boundaries (for example, a company's premises or an area of operation). When a location-aware mobile device enters or exits a geo-fence, the device receives a generated notification. This could contain information about the location of the device.

Sophisticated device management software enables organisations to define geo-fences and assign rules that permit actions to be applied whenever users enter or leave the specified areas.

**Use of Iris scanning will continue, but will generally be only used in static locations.**



## Device management

Managing mobile devices deployed 'within premise' (e.g. in a warehouse) is relatively easy. If there is a problem with a device, support teams are generally on site to resolve the issue quickly, reducing the downtime of the worker. However, many mobile solutions now involve the deployment of hardware in the field, which makes device management a much more difficult problem.

Device management solutions have been designed specifically to cater for the large number of devices now deployed remotely. They offer remote management and support of the devices, including asset tracking, reporting, software updating, upgrades 'over the air', device security, remote configuration and provisioning. Device management solutions provide all of this functionality from a central location. IT teams can therefore centrally manage and support large scale mobile deployments whilst minimising any downtime of the remote workers – all without the need for additional investment.

## Secure networks

As mobile solutions have evolved, a large number of devices are now being deployed remotely and are using 3G/GPRS networks to send important business data back to the central system. These systems are typically hosted within the corporate network, which has been highlighted by many organisations as a potential security risk. As a result, many customers are demanding solutions that can provide a higher level of security.

There are various ways in which this need has been addressed. Firstly, network providers (such as Vodafone, O2 and Orange) offer private APNs to operate the WWAN network. An APN (Access Point Name) is used as part of the mobile phone providers' data network – typically, general users all share a common APN. This means that all data traffic flows through a common point, which increases the risk of data corruption and loss. Private APNs are seen as a way of securing data traffic across a WWAN network, as only the organisation's remote workers can pass data back through the APN.

There are a number of mobile VPNs (Virtual Private Networks) available that provide the same security and features as the VPN's remote office workers use on their laptops. Mobile VPNs allow mobile devices to act as if they are connected to the corporate network (just like an office desktop PC). They can also provide detailed reporting on mobile network usage and can seamlessly switch between wireless or 3G/GPRS, depending on the location of the remote worker. This allows mobile solutions to take advantage of wireless hotspots. This reduces the amount of data that needs to be sent via the 3G/GPRS network, which in turn reduces the cost of mobile data transfer from the remote workers.

These systems create mobile solutions that are highly flexible and secure. However, they also increase the cost. As always, it is a trade-off between the cost of producing a secure solution and the cost of a breach in your organisation's network.

## Android v Microsoft

Users are still confused about the relative merits of Microsoft and Android smartphones. The recent explosion in the popularity of Android and iPhones has prompted some larger rugged mobile manufacturers to consider providing enterprise-grade devices that use Android. However, these aren't readily available at the moment.

This is mainly because the key requirements for an enterprise device are stability and longevity. However, the average consumer device has a shelf life of 6 to 12 months. This is why Microsoft launched its Windows Embedded Handheld solution in December 2010, complemented by Windows Embedded Compact. Both products were developed specifically for handheld mobile enterprise solutions. They integrate with device management solutions and are compatible with Windows Mobile 6.x applications. Microsoft therefore remains the operating system of choice for enterprise solutions, due to its commitment to ongoing support and product evolution.

## Cloud computing

Cloud computing enables an organisation to access a wealth of hardware and software capabilities over the Internet. This eliminates the need for a large capital outlay on infrastructure. The cloud enables companies to drive change and improve the performance of both their IT systems and their business. One powerful way in which it can be used is for device management.

Organisations increasingly need to drive the efficiency and performance of their mobile solutions whilst reducing overall costs. Device management plays a key role in this. The central control, management and support of mobile devices through a cloud service can significantly improve operations, boost productivity and reduce costs.

## GIS (Geographical Information System)

This is a mapping system that combines layers of information about a location to give a better understanding of that place. GIS data and technology are now regularly incorporated within mobile computing solutions.



### Card technologies

The magnetic stripe (on a magnetic stripe card) is basically stored data. There are three tracks available, all of which are capable of recording a set amount of data which is regulated by the standards agency. Examples of magnetic stripe cards include ID cards, library cards and credit cards.

Smart cards incorporate a chip in which data can be written and stored. The chip is more robust, holds more data and is more fraud resistant than magnetic stripe cards. Smart cards continue to replace magnetic stripe cards. All credit cards in the UK have moved over to this technology.

**Many remote workers are completely on their own.**





Spirit is a rugged mobile data capture specialist. We offer hardware, software and pre- and post-sales support. We specialise in delivering innovative and cost effective solutions across many industries. If you would like further advice, please contact us at:

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