

Information Systems in the Workplace – The Role of Wireless and Mobile Information Technology

a report by

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When considering the use of wireless in the workplace, it is first essential to see the whole issue from a user's perspective. The first analytical step in approaching this issue is to look at the information that is likely to be needed.

Information Needs for the Mobile Worker

Contrary to the wireless industry's hopes, most of the data that mobile blue-collar workers need is fairly static and, in many cases, can be delivered or updated via a local-area network, by sending a DVD or CD/CD-ROM or on an occasional visit back to their headquarters. Maps, diagrams of equipment or plans of buildings do not often change. Sometimes the status of some of the items on a map may change, the condition of a switch or a valve for example, but, for the most part, core data is both bulky and static. The key aspects for leveraging user productivity upwards, to tracking items and perhaps to billing promptly to achieve good cash flow are job dispatch, job status and staff availability/location data.

Some mobile services have a culture that predisposes them to require static data to be delivered just-in-time, making wireless a key component. These tend to be services in which emergency or privacy is a core value and where the loss of a mobile terminal that holds stored data would lead to a loss of security. Generally, realtime applications such as these are for use in the armed forces, the police or ambulance services. A few utility and service sector users have taken the view that all data should be accessed in realtime; however, they pay significant costs and become vulnerable to wireless network failures and bad coverage.

In 1988, it was predicted that a static database of nine gigabytes would satisfy most mobile workers. Although utilities with greater amounts of data exist, this prediction is fairly accurate. In terms of need-to-know data, if properly indexed and structured, this level of static data augmented with modest but reliable realtime voice and data, remains the core requirement of the sector.

The Information Flow

A significant issue in a business-to-employee (B2E) system implementation is the issue of back-end integration and access to legacy data. For field information technology (IT) systems to be useful they need a structured interface linking them to corporate data sources, with the design and construction of these interfaces often being the greatest challenge for the implementation team. Modern corporate data systems may have roots in SAP®, Oracle® or the like, and the recent Geographic Information System will be from the mainstream supplier. If well documented, these systems may be relatively easy to write interfaces for. Many older service sector businesses have bespoke core systems that have already had a lifespan of 20 years. Such a legacy makes integration difficult, and is often an obstacle to rapid introduction of mobile B2E systems.

Wireless Systems and Communications

Most current service sector communications systems – short message service, data over GSM™, Mobitex and, more recently, GPRS/WAP – carry small amounts of time-critical data. These bearer technologies deliver the few kilobytes needed to dispatch, acknowledge or confirm a job, or to order parts. While it is viable to deliver such communications using thin client systems and remote intranet sessions, in effect, there are presently few adopters prepared to provide the fieldworker with a live 'browser' session. The data traffic required to run such services is high and this implies high communications costs and a dependence on the integrity of the communication link. The browser approach has merit where maps and diagrams are to be delivered; however, transaction-based fieldwork will not benefit from this approach.

There are likely to be limited applications for streaming video and similar proposed 3G services and the use of such services may be limited to critical incident management and therefore will not provide the killer application base load that will make such services cost-effective and ubiquitous. The message here is that 3G in itself is unlikely to

be of benefit to the mobile service sector, but that the 'always-on' characteristics of GPRS and 3G, like their Mobitex predecessors, will be of use and will provide a reason for upgrade. The persistence of the connection and the extension of a virtual Transmission Control Protocol/Internet Protocol (TCP/IP) wide-area network is therefore the attractive characteristic of the new wireless systems, rather than the data capacity.

The Mobile Terminal

Ten years ago, most mobile IT projects proceeded along the lines of locating a single information device, perhaps a personal computer or a laptop. This device would be multifunctional and intended to cover all needs. Current thinking is somewhat different in that there will now be a small suite of mobile devices. These may be interconnected by wires, infrared or Bluetooth™. The more practical workers will need a telephone device and a much larger screen device on which to view diagrams, parts lists and plans/maps.

Further up the management ladder, the 'knowledge worker' or middle manager, will use a laptop and a telephone/e-mail device. The executive has the most modest needs of all, requiring access to a mobile e-mail facility and a phone, probably by use of a combined personal digital assistant and handset.

The choice of terminal is needs-driven. Where work and information can be structured, systems with limited voice and pen interfaces are proving successful. There is no evidence yet that handwritten text or speech interfaces will work; however, in this sector there is evidence of the use of both interfaces for limited vocabulary applications, even in noisy surroundings. While most users cite a good (daylight-readable) screen and good battery life as the most desirable characteristics for a mobile device, the industry that designs these items believes that processor speed is all important and pursues this at the expense of battery life. In the last 10 years, virtually no progress has been made in achieving a well-specified portable computer with a large screen and a battery life lasting a full working day. The introduction of wireless interfaces will simply serve to aggravate the battery problem, as the higher performing wireless devices further reduce the battery life for autonomous working.

Mobile computer terminals deployed in the service sector have tended to be more robust. These units are costly and are usually expected to achieve a life exceeding five years of service. This tradition of employing specialised hardware is a further reason for the cautious approach in the B2E marketplace. A recent trend in adopting commercial hardware has changed the cost base and attitude in some users,



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with an acceptance of a more disposable culture. In practice, providing workers with more attractive but somewhat fragile devices does not result in a rise in damage, with staff respecting the vulnerability of the more fragile devices. Cables, bags and connectors, however, need to be robust, otherwise they present the most significant failure points.

Managing the Mobile Worker/Workplace

A range of issues from health and safety to the management of remote workers are significant emerging factors. The passing and authorisation of documents by wireless should free managers from the in-tray, allowing more innovative developments. Businesses that seem to benefit most from the wireless and mobile revolution are those that use the technology to liberate managers and empower staff. By becoming proactive, managers can move to a more interesting coaching and motivating role, leaving the mobile IT system to run the back-office. As the mobile IT system becomes an accepted work tool, it will come under similar emerging health and safety law to that which currently applies. Usability assessments will sit alongside hazard assessments in the process of arriving at a useful system with a high level of user acceptance.

Location-based Systems

Technology exists to remotely locate the worker, goods or assets accurately. The global positioning system provides a 10-metre accuracy, but systems based on using the mobile phone system as a location tool are also now emerging. These locator systems require infrastructure enhancements from the network operators and are therefore dependent on investment. In the US, mobile phones must be able to be located using this technology as, under the US Federal Communications Commission (FCC) E-911 directive, all network operators must be able to report a location for any emergency caller. These features are not mandated elsewhere, so may not be a feature of many national networks.

Privacy issues in location reporting need to be resolved but, once resolved, it is certain that position data will have a value in the B2E market. So far, the more successful B2E applications using location services are those where the system manager has emphasised the enhanced safety that a lone worker enjoys if his/her location is known, rather than emphasising the control aspects of the facilities.

Open Standards and Remote System Maintenance

Two other factors affect the adoption of wireless

technology in the B2E enterprise arena: maintenance of the remote software with its associated data; and confidence in an evolutionary path towards future technology. The former issue is practical. It involves major cost to recall thousands of mobile devices to deploy a software upgrade or to refresh the data in a static database. A system maintenance strategy and the software to support that strategy is virtually essential when the user base rises towards 1,000 and can usually be justified in quite small implementations.

The second issue, of standards and longevity of architecture, is more troubled. As mobile systems have evolved, many neat and efficient proprietary protocols have emerged to shuffle the data from field to office and back. The present move towards eXtensible Mark-up Language (XML) and similar standards-based data formats is to be welcomed. WAP is a step towards a more efficient mobile Internet Protocol, though inept marketing and its introduction ahead of GPRS have slowed its acceptance unfairly. The B2E community regards data protocol lock-ins with caution and is increasingly aware that 'bloated' data available on the public wired broadband Internet is inappropriate to the wireless connected community, especially when paying for data access per kilobyte. Confidence in standards will remain important to those tasked with large corporate enterprise mobile IT services.

Conclusion

All service sector businesses can derive massive benefits from well-focused mobile IT services delivered to front-line staff. Those who have done this can clearly show the benefits both in customer satisfaction and business efficiency. Many early adopters are now using 2G systems, and have no difficulty making the cost benefit predictions needed to release cash for planned developments and upgrades. Wireless and memory technology underpin this opportunity, though the system requirements to achieve a business benefit may be surprisingly modest and there are likely to be few early B2E adopters of such novelties as 3G streaming video.

The domestic mobile GSM market was stimulated with the introduction of prepayment and sustained by marketing mobile phones as 'fashion items'. The business community is much harder to impress and whereas with voice we all have a built-in interface (i.e. a mouth), for mobile data, the cost of a well-defined database interface that can be hit by many users simultaneously is a different matter. The B2E market is not driven by whim, but by a process of cautious analysis. Confidence, standards, coverage and reliability are what are needed for the B2E wireless data market to grow. ■