



**THE BUSINESS CASE
FOR EMPLOYEE MOBILITY SUPPORT**

By

Norm Archer

archer@mcmaster.ca

**McMaster eBusiness Research Centre (MeRC)
DeGroote School of Business**

MeRC Working Paper No. 9

June 2004

Innis

HF
5548.32
.M385
no.9



THE BUSINESS CASE FOR EMPLOYEE MOBILITY SUPPORT

By

Norm Archer

MeRC Working Paper # 9
June 2004

© McMaster eBusiness Research Centre (MeRC)
DeGroote School of Business
McMaster University
Hamilton, Ontario, L8S 4M4
Canada
archer@mcmaster.ca

ABSTRACT

Mobility is an aspect of many jobs, and the rapid evolution of electronic mobile solutions is presenting many opportunities to support employees in a broad range of endeavors. There is no framework currently available that provides a comprehensive approach to choosing appropriate mobile solutions, based on an objective evaluation of potential mobile applications in an organization. This paper builds a process framework for evaluating mobility business cases, including the activities of: defining the business goal or operational imperative; outlining mobile user groups and applications; technical considerations; potential mobility choices; implementation considerations; and evaluation of the ROI and other softer measures of the potential mobile application, compared with the existing application it will replace.

KEYWORDS

mobile, wireless, value proposition, evaluation framework

ACKNOWLEDGEMENT

This work was supported by a grant from the Natural Sciences and Engineering Council of Canada.

TABLE OF CONTENTS

	Page
1. INTRODUCTION.....	4
2. MOBILE SOLUTIONS.....	4
2.1 Pervasive computing.....	5
3. VALUE PROPOSITION FOR MOBILE AND WIRELESS SOLUTIONS... ..	5
4. EVALUATION OF MOBILE BUSINESS APPLICATIONS.....	6
4.1 Business goal of operational imperative.....	7
4.2 User group and application definition.....	7
4.3 Technical considerations.....	8
4.4 Mobility choice.....	8
4.5 Implementation considerations.....	9
4.6 Mediating influences.....	9
4.7 Mobile applications and ROI evaluation.....	10
5. FRAMEWORK APPLICATION TO E-HEALTH MOBILITY	10
6. CONCLUSIONS.....	11
REFERENCES.....	11
FIGURES	
1.0 Process framework for mobility business case evaluation.....	7

1. INTRODUCTION

Mobility is an aspect of many jobs. How mobility affects a job tends to differ, depending on the nature of the job, the preferences of the person holding the job, the form that mobility takes, and the proportion of time involved. Supporting mobile work through electronic solutions on wireless networks is an aspect of eBusiness (electronic business) that is having a growing impact on the workforce, by enabling workers, managers, and executives to carry devices that assist them to stay in constant communication with their organizations. They may use voice or data messages, paging, direct communications by telephone or teleconferencing, and database or document information access, storage, and retrieval. Such applications are often built upon existing eBusiness solutions such as corporate and operational databases, along with functional or corporate support areas and associated networks such as LANs and Internet connectivity. The growing availability of a variety of mobile applications and technologies has encouraged the extension or replacement of existing approaches and business processes. But we are only beginning to see true wireless organizations where processes, technology and people are fully aligned to mobile working. This shift in working practice will grow in its impact on all aspects of business, ranging from business process design to how employees relate to colleagues and clients, resulting in a new corporate culture that fully embraces mobility.

The real benefit of mobility support will come only when technology and process are built around a plan that embraces mobility, and where mobility is not an afterthought. As mobile solutions are having an increasing impact on business, there has been a great deal of experimentation, not always with positive results. A published survey of 100 businesses using mobile solutions (Violino, 2003) found that 10% had received a full ROI (Return On Investment), 57% had received a partial ROI, and 33% had not received a measurable ROI. As mobile wireless unfolds, the business world needs to assess both its technical and competitive aspects, to determine if it has a real value proposition to offer. There is no framework currently available that provides a comprehensive approach to decision making, based on an objective evaluation of potential mobile applications in an organization. The objective of this paper is to discuss the roles that electronic mobile solutions can play, focusing on value propositions and the evaluation and selection of mobile solutions for efficient and effective use in organizations.

2. MOBILE SOLUTIONS

Mobile support for an employee's role may be either compulsory or voluntary. The potential selection of systems and devices for mobile support of voice, data, and multi-media communications, ranges all the way from cell phones to laptop computers and PDAs (Personal Digital Assistants). At the outset of this analysis, it is taken for granted that all employees have ready access to voice communication through cellphones, since these are rapidly becoming as ubiquitous as landline telephones. Mobile or wireless solutions discussed will automatically include and go beyond cellphone voice communication.

Mobile solutions can be used for support in a variety of industries. Some people, such as field service or sales personnel, hospital or clinical workers, or community healthcare practitioners or their patients, may be "on the road" and away from the office a high percentage of the time, while traveling or meeting with clients. Others may travel occasionally to different sites for meetings, conferences, or training. Workers in plants, warehouses, or logistics operations may use mobile devices to link to online databases, control systems, or to communicate with other employees. Clients such as ambulatory care patients may also adopt mobile or monitoring devices, in order to use the services of mobile healthcare providers. Still other employees may choose or be required to telework as part of their job. This typically involves working semi-permanently at a site such

as a home or satellite office, but meeting occasionally at some central point with team members and/or managers.

Mobile solutions allow employment hours to be flexible and to extend beyond those hours actually spent in the office, including lunch and break time, traveling to and from work, traveling to meetings, holidays, weekends and evenings. Although this may result in an attendant increase in productivity, working with others through mobile applications may not necessarily fulfill all the needs of workers. They also have social needs to interact directly with others (Wiberg & Ljungberg, 2001), and the related physiological and sociological implications due to a lack of this type of interaction are open to debate.

2.1 Pervasive computing

Pervasive computing can be defined as personalized computing freed from the desktop, enabling information access anywhere, anytime, on demand. This is an apt description of the objective of mobile worker support. Computing devices range from desktop (fixed), to laptops and palmtops (transportable) to handhelds and wearables (fully mobile) (Gorlenko & Merrick, 2003). Mobile devices can be differentiated according to their wireless connectivity. Content transmitted by technological solutions in the mobile wireless world can be mobile (but not wirelessly connected for synchronization with wireline content), wireless (but not mobile), or both mobile and wirelessly connected. Mobile wireless content is converging with the wireline Internet, with the result being referred to as the mobile Internet. The growing mobile wireless market demands both voice and data (text-graphics) communication services. Multi-media content is a suitable mix of the two. The content is carried through the network of a wireless network operator and a service provider. Some mobile devices are unconnected while on the move (e.g. PDAs – Personal Digital Assistants, laptops, and palmtops) although they may be equipped for synchronization through wireless connectivity in a stationary environment.

The class of devices that is both wireless and mobile includes handhelds and wearables. The fully mobile employee is not just linked to business systems so data can be communicated, but must also have voice communications with the people with whom he/she must interact. Additionally, some systems are voice activated to compensate for limitations in keyboard entry and information display in mobile device interfaces, many of which have interface capabilities that are limited by physical size (Ringland & Scahill, 2003).

3. VALUE PROPOSITION FOR MOBILE AND WIRELESS SOLUTIONS

The business model for adopting mobile solutions is the economic justification for an organization's use of the technology, or the means by which the technology generates a value proposition. The technology management literature shows that firms have great difficulty managing innovations that fall outside their previous experience, where earlier beliefs and practices no longer apply (Chesbrough & Rosenbloom, 2002). In the current wireless marketplace, with an increased system complexity that is driven by the number of players and their interactions (Olla & Atkinson, 2004), (network operators, carriers, content providers, mobile device manufacturers, etc.), the value chain is developing into linkages of partnerships for delivering value to end customers (Sabat, 2002). End customers may be individuals or they may be networks of people who interact in such a way that mobile solutions can assist in improving their interactions cost effectively. Business partnerships involved in supporting mobile solutions continue to evolve, engage, and disengage as new technology evolves and appears, and certain business partners thrive while others fail.

It is often difficult to justify a business case for a mobile project financially. A 2002 survey by *CIO Magazine* (Worthen, 2002) indicated that the two most popular measures of ROI for wireless projects were increased productivity (54 percent) and improved internal customer satisfaction (40 percent). These tend to be soft measures, and sometimes they are hard to quantify in terms of financial return. But from the end user viewpoint, for a mobile service to be perceived as useful, it must: 1) offer services that satisfy user needs, 2) match the users' degrees of mobility, 3) be compatible with other devices users may also be using (such as desktop computers), 4) be accessible throughout the desired coverage area, and 5) provide stable and reliable access (Zhu et al, 2003).

Mobile commerce (mCommerce), involving business transactions supported by mobile solutions, has some of the business characteristics of electronic commerce (eCommerce), and is one of the major groupings of mobile applications: mobile entertainment, mobile messaging, location-based information systems, mobile commerce systems, and mobile data systems (Olla & Atkinson, 2004). A consumer survey of value creation in mCommerce indicated that consumers have a low willingness to use mobile services in general, but an exceptionally high willingness to use certain applications (Anckbar & D'Incau, 2002). The learning from this study is that a mobile application that is highly suited to, and supportive of, a specific business application for a group of employees will be adopted readily, but those that are less well-suited will not be adopted readily or will fail.

To justify mobile solutions, many organizations that deploy some kind of wireless data solution do so on a very selective basis, supporting only those employees who have a demonstrated need for real-time access. There are strong indications that return on investment (ROI) can be most strongly justified for specific classes of tasks in vertical markets such as healthcare, manufacturing, government and transportation (Wheelwright, 2002). For example, a recent study of mobile solutions in a variety of applications in 35 major companies found hard benefits that included sales increases of 5-10%, reduced customer wait times by as much as 80%, increases in service calls of up to 32%, and service call responsiveness improvements of up to 7% (Gillott, 2002). Payback periods ranged from a few months to 30 months. However, another source (Brewin, 2004) indicates that CIOs (Chief Information Officers) did not think that ROI was an important concern. In several cases, large aircraft manufacturers had rolled out substantial installations of mobile/wireless applications without considering ROI implications.

Mobility and flexibility are the biggest drivers of mobile solutions in many organizations (Wheelwright, 2002). Organizations may choose wireless solutions because they have an outbound workforce that needs to be connected within a corporate environment or when making sales calls to clients. They generally do not implement wireless solutions just to save money on cabling. Cost and security seem to be the biggest inhibitors of mobile adoption in many organizations. Cost has slowed the adoption of mobile technology in the past, although it is becoming less of a concern as prices drop and organizations recognize the benefits of offering wireless access to their workforces. Security is an important aspect of mobile systems that can be very complex. Security aspects that must be considered include: location-based device tracking may present privacy problems; systems that allow roaming between wireline and wireless networks are more easily compromised; and mobile devices may carry valuable organizational or personal information that must be protected from theft (Veijalainen & Visa, 2003).

4. EVALUATION OF MOBILE BUSINESS APPLICATIONS

The novelty of many of the mobile applications currently entering the marketplace, along with business inexperience with mobile solutions, greatly increases the risks associated with adopting such solutions. For this reason, the business value proposition of proposed mobile applications

must be studied with care. To that end, the process framework in Figure 1 organizes the planning and evaluation process logically. This proceeds from identifying the business goals, defining potential user groups and the applications they would use, and the technical considerations that will lead to the appropriate mobility choice. When implementation issues are factored in, tempered by a variety of mediating influences, the application can be evaluated, along with its ROI, and compared with the existing application in terms of tangible values such as revenue, cost, and efficiency, and intangibles such as user and customer satisfaction. The business case evaluation process is discussed in more detail in the following.

4.1 Business goal or operational imperative

Rather than trying to justify spending money on a particular technology, it is important to articulate clearly at the outset an overall business goal or operational imperative, such as: improving customer satisfaction ratings, reducing order fulfillment time, or collaborating with suppliers to reduce costs in the value chain.

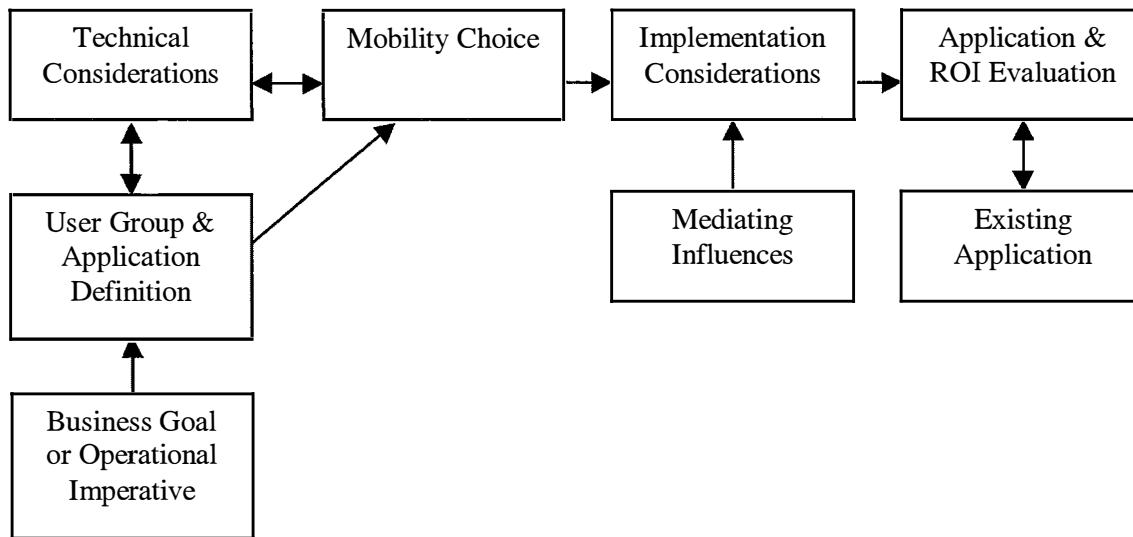


Figure1. Process framework for mobility business case evaluation

4.2 User group and application definition

The mobile workforce can be categorized by job function, work setting, and travel demands, so the plan can include profiles of each mobile user group, identifying the information needs of the entire mobile workforce. Successful mobile computing applications are those that focus on mission-critical applications and have a clear ROI (Albright, 2003). Experience in many organizations has been to begin with the installation of wireless e-mail, served through a combination of digital cell phones and wireless LANs. However, the lack of clear benefits to employees often stalls further use of mobile applications in these organizations. Further, successful approaches have been to prioritize mobile applications in general by starting with small projects, and using the benefits realized through these projects to justify further expansion. The top three mobile corporate applications found in one study were dashboards and reports, sales force automation, and supply chain event management (Albright, 2003). It appears that always-

on mobile applications are not necessary in many situations, because wireless connectivity is currently too expensive and unreliable for always-on use. Mobility projects may make use of mobile PDA solutions, if instant connectivity is not essential, since the necessary infrastructure is less expensive. Wireless may be used instead to connect devices to corporate servers from time to time for synchronization or to facilitate real-time alerts and messaging. When a mobile application is being considered, work flow analysis should be used to determine whether the relevant business process should be changed as well as the technology support. It is important to clearly identify the information access and process problems that are potentially solvable with mobile devices.

4.3 Technical considerations

IT managers face common mobile device deployment issues, such as acquisition and maintenance costs, data security, middleware, application modifications, user training and backup procedures. Integration of the mobile system with existing IT infrastructure poses serious problems if open source systems are not used, since proprietary systems may or may not provide the appropriate interfaces. Technical considerations include an evaluation of the ability to incorporate mobile solutions within the existing IT infrastructure, and the availability of internal expertise, experience, and resources to support new mobile applications. It may be necessary to get consulting support for the first serious mobile application in the organization, and to have technical personnel trained in the installation and management of the proposed technologies. Additional environmental considerations may include a survey of the organization's LAN communications, spectrum analysis in order to avoid conflict with existing applications, study of existing and potentially required remote coverage and network linkages, and reliability, security, and privacy considerations.

Apart from independence from location, instant connectivity is a distinguishing feature of mobile services compared to conventional desktop applications (e.g. instant voice connection to working partners, ready access to e-mail, immediate links to online databases for retrieval and storage purposes). However, there are numerous inhibitors of mobile device use, compared to conventional technologies such as PCs, including: small screen size, lack of standard-sized keyboard and mouse, limited graphical content, and low bandwidth. Other limitations of current mobile technologies include small memory capacity, slow CPU, and time-limited battery capacity (Agosti & Ferro, 2003) (Zhu et al., 2003). The greatest advantages of mobile solutions appear when communication is urgent and stationary infrastructure is not available. Mobile applications should have the highest priority where these characteristics are important.

Agosti et al (Agosti & Ferro, 2003) suggest that, to make mobile devices easier to use and to access a variety of content with less difficulty, the content to be accessed needs to be adjusted to the mobile device in current use, on the fly if necessary, but without compromising the user's mobility. This may be accomplished through the use of transcoding (Britton et al., 2001), a technique that automatically deconstructs the content of HTML, XML, PDF, and other documents, and reassembles a limited set of selected components in a form that is suitable for specified mobile device display.

4.4 Mobility choice

For operational enterprise support, the classifications that would be under consideration are one or more of mobile messaging (short messaging service, enhanced messaging service, and multimedia messaging service), location-based information systems (information based on

geographical positioning information of the user), and mobile data systems (transmitting and receiving data to/from mobile workers, and remote monitoring) (Olla & Atkinson, 2004). A careful matching of user group and application with mobility choice will greatly improve the likelihood that the application will be accepted and used successfully.

4.5 Implementation considerations

Implementation of the chosen approach includes system design, vendor choice, device choice, planning the deployment of the system and mobile devices, system installation and support, training, prototype testing, and installing control mechanisms to manage the deployment and use of mobile solutions. Planning efforts can be improved with an objective perspective from an independent consultant or a third-party acquisition or integration partner. The alternative is establishing and maintaining relationships with multiple vendors. It may also be necessary to outsource project components, such as programming, training or support. Selecting the appropriate applications, devices and accessories is critical. Additionally, internal databases may need to be modified and secured for access by a mobile workforce.

A study by Luarn (Luarn et al, 2003) on field mobilization of insurance sales personnel defined four steps in the implementation: 1) defining mobilization requirements (working with both upper management and field personnel), 2) choosing the solution VAR (Value Added Retailer), 3) conducting internal communication and educational training, and 4) establishing control mechanisms. However, the study did not consider infrastructure and security, issues that are critical to any mobile system. A study by Smaling (Smaling, 2003) examined the healthcare field but could be broadly applied in other industries. He suggests taking an enterprise perspective through the following steps: 1) focus on workflow analysis, 2) perform a detailed site survey and spectrum analysis, 3) classify potential end-users into groups according to their functions (each group will have different requirements for their mobile applications), 4) develop a layered security model (multiple protective rings around the mobile infrastructure), 5) develop management tools that address both core infrastructure and end-user devices, 6) emulate and test thoroughly the production environment in a situation where damage cannot occur.

4.6 Mediating influences

Considerations that affect the successful implementation of a mobile application are similar to those in any application that is new to the organization, including: 1) top management support, 2) resource commitment to the project, 3) establishment of a mobilization team, 4) user participation in the project, beginning with the planning phase, 5) a proper training program, and 6) customer-facing considerations. Improvements in customer-oriented applications are likely to have the most direct impact on ROI and bottom line profitability (Gillott, 2002). Critical success factors that have been identified elsewhere (Luarn et al., 2003) are: top management support; well-planned implementation process; establishment of a mobilization team; full understanding of user needs; high degree of eBusiness implementation in the organization; choice of the solution VAR; establishing communication channels; provision of education and training; comprehensiveness of system functions; and establishing control mechanisms. An organizational culture consideration that can be a significant obstacle is the resistance of employees and management to change. However, other intangibles such as image can encourage usage, resulting in improved outcomes. A lack of attention to any of the influences mentioned here can have a negative affect on user acceptance, resulting in projects that should not be undertaken until these risks are mitigated satisfactorily.

4.7 Mobile application and ROI evaluation

Before calculating ROI, it is important first to check that the business goals are being addressed by the project (see Section 4.1). Secondly, ROI can be calculated if financial measures are available, but soft measures such as potential employee satisfaction must also be included in the review. Finally, it is essential to compare the mobile solution with the existing application and process to ensure that there is a significant gain to be realized. In calculating the ROI, cost considerations include software, hardware, installation, and ongoing maintenance. Savings include some that are more easily quantifiable than others such as network cabling, IT staff time, and employee time savings (e.g. it is more easily to move among offices or to use virtual offices for employees who are mostly on the road). Less quantifiable are improved organization image, for example. Costs and savings will vary from industry to industry and among employee groups within different organizations. For example, virtual office operations and field sales operations tend to have a higher ROI from mobile investments in groups with little customer-facing work. As another example, in health services, ROI only has a meaning when it improves the quality of health care. However, the term “productivity improvement” may be taken as a synonym for staff level reductions, a term that clearly generates unease among workers (Jacobs, 1999).

Measures of expected improvements should include potential user acceptance, and whether the flexibility available from the mobile system will result in improved productivity. All estimates of ROI should include a comparison with the existing system and its associated business processes, to ensure that changing the system is better than just revising the current system and related processes. Technology will not solve an existing business process problem, and implementing mobile solutions should not be just a costly excuse to implement new technology. Other comparisons that can be made are partial implementations, such as WiFi (“Wireless Fidelity”, or wireless access to a Local Area Network) installations for a specified group or workers, where the mobile application will have a specific and strong impact, rather than diluting the effect by extending it to the entire organization.

5. FRAMEWORK APPLICATION TO E-HEALTH MOBILITY

This is a brief summary of applying the proposed process framework to physician adoption of mobile solutions, based on the proposed framework. In this case, the operational imperative is seen typically to improve quality of healthcare, while a secondary but important objective is to manage costs. There are two distinct user groups of physicians: physicians working in a hospital or clinical environment, and those working outside this environment (and of course there are other healthcare workers in their own classifications). There are many common needs among all physicians (Cocosila & Archer, 2004), including: access to evidence-based medical reference materials; electronic medical records; drug reference material; prescription writing; checking and validating drug/patient/condition matches; disease or condition identification and coding; record keeping; personal information management; medical calculations; communications with colleagues and patients; decision support tools in training situations; and off-duty needs. Beyond this, physicians within a hospital setting need: availability for immediate contact; ability to locate specific patients; and patient data during emergency conditions. Physicians working external to hospitals need: ability to communicate with home care personnel; ability to manage chronic patient conditions; and communication and consultations with medical experts.

Technical issues in the healthcare context include: security; privacy; connectivity; compatibility among information sources; and integration of multiple systems maintained by hospitals, home care programs and private physicians. Further, reliable coverage of the region serviced by physicians is critical to an acceptable mobile system. Choice of a mobility solution would be

based on the feasibility of matching the needs of the specific physician group with a solution that would best meet these needs. Implementation considerations include: system design; choice of system integrator; vendor selection; user interface design and testing; and training. Strong mediating influences arise from: user mobility; flexibility; ease of use; reliability; available communication modes; and involving all the stakeholders (physicians, nurses, hospitals, homecare workers, funding institutions, and other staff) in the evaluation process. In health services, patient privacy is always an important consideration. In addition, concerns of physicians include non-interference with the physician-patient relationship, and that the physician is not just taking on an additional workload with no compensation. Assuming that a choice is made that is based on a limited prototype implementation, it is important to re-evaluate, based on the prototype, whether the operational imperative and the cost management objective are met. If the proposed mobile system compares favorably with existing practices in terms of quality of healthcare and ROI, then a major barrier to implementing a successful mobile system has been overcome.

6. CONCLUSIONS

In this study we have shown the potential of mobile support for employees in a broad cross section of organizations. We have also developed a value proposition for mobile and wireless solutions, based on both ROI and softer measures, and suggested that organizations should employ mobile solutions effectively on a very selective basis to employees with a demonstrated need. Finally, we have shown the importance of a logical approach to evaluating the business case for mobile solutions, based on a process framework that begins with defining business goals or operational imperatives and ends with an evaluation of alternatives based on ROI and other measures. The real benefit of mobility support to an organization will come only when technology and process are built around a logical plan that embraces mobility, and this can be supported through application of the proposed process framework.

REFERENCES

- Agosti, M., & Ferro, N. (2003) "Managing the interactions between handheld devices, mobile applications, and users", in K. S. a. E.-P. Lim (Ed.), *Advances in Mobile Commerce Technologies*, Hershey, PA: Idea Group Inc., pp. 205-234.
- Albright, B. (November 2003) "Mobile computing still stalled in the enterprise", *Frontline Solutions*, 4, p. 40.
- Anckbar, B., & D'Incau, D. (2002) "Value creation in mobile commerce: Findings from a consumer survey", *Journal of Information Technology Theory and Application*, 4(1), pp. 43-64.
- Brewin, B. (February 23, 2004) "CIOs say ROI on mobile devices not a big concern", *Computerworld*, 38, p. 12.
- Britton, K. H., Case, R., Citron, A., Floyd, R., Li, Y., Seekamp, C., et al. (2001) "Transcoding: Extending e-business to new environments", *IBM Systems Journal*, 40(1), pp. 153-178.
- Chesbrough, H., & Rosenbloom, R. S. (2002) "The role of the business model in capturing value from innovation: Evidence from Xerox Corporation's technology spin-off companies", *Industrial and Corporate Change*, 11(3), pp. 529-555.

- Cocosila, M., & Archer, N. (2004) "Mobile healthcare answers to chronically ill outpatient non-adherence: Joint roles of technology and patient participation, (MeRC Working Paper #11), Hamilton, Canada: DeGroote School of Business, McMaster University.
- Gillott, I. (April 2002) "The ROI benefits of wireless", *Communications News*, 39, p. 6.
- Gorlenko, L., & Merrick, R. (2003) "No wires attached: Usability challenges in the connected mobile world", *IBM Systems Journal*, 42(4), pp. 639-651.
- Jacobs, D. M. (1999) "Candid comments on wireless", *Health Management Technology*, 20, pp. 8-10.
- Luarn, P., Lin, T. M. Y., & Lo, P. K. Y. (2003) "An exploratory study of advancing mobilization in the life insurance industry: The case of Taiwan's Nan Shan Life Insurance Corporation", *Internet Research: Electronic Networking Applications and Policy*, 13(4), pp. 297-310.
- Olla, P., & Atkinson, C. (2004) "Developing a wireless reference model for interpreting complexity in wireless projects", *Industrial Management and Data Systems*, 104(3), pp. 262-272.
- Ringland, S. P. A., & Scahill, F. J. (2003) "Multimodality: The future of the wireless user interface", *BT Technology Journal*, 21(3), pp. 181-191.
- Sabat, H. K. (2002) "The evolving mobile wireless value chain and market structure", *Telecommunications Policy*, 26, pp. 505-535.
- Smaling, J. (November 2003) "The strategic view of wireless infrastructure", *Health Management Technology*, 24, pp. 32-34.
- Veijalainen, J., & Visa, A. (2003) "Security in mobile computing environments", *Mobile Networks and Applications*, 8(2), pp. 111-112.
- Violino, B. (December 2003) "A method to the mobile madness", *Optimize*, pp. 83-85.
- Wheelwright, G. (December 3, 2002) "The business benefits of mobility", *Financial Times of London*, p. 11.
- Wiberg, M., & Ljungberg, F. (2001) "Exploring the vision of "Anytime, Anywhere" in the context of mobile work", in Y. Malhotra (Ed.), *Knowledge Management and Business Model Innovation*, Hershey, Pennsylvania: Idea Group Publishing, pp. 153-165.
- Worthen, B. (December 1, 2002) "When wireless works", *CIO*, 16, p. 1.
- Zhu, W., Nah, F. F.-H., & Zhao, F. (2003) "Factors influencing user adoption of mobile computing", in J. Mariga (Ed.), *Managing E-Commerce and Mobile Computing Technologies*, Hershey, PA: IRM Press, pp. 260-271.

INNIS REF
HF
5548.32
M385
no.9



McMaster eBusiness Research Centre

McMaster eBusiness Research Centre (MeRC)

DeGroote School of Business

McMaster University

1280 Main St. W. MGD A201

Hamilton, ON

L8S 4M4

Tel: 905-525-9140 ext. 27027

Fax: 905-528-0556

Email: ebusiness@mcmaster.ca

Web: <http://merc.mcmaster.ca>