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By now, you are fully bewildered by all that you have read about the promise of mobile e-business (or m-business). Is it the "Next Big Thing," as many pundits have contended, a disruptive technological leap that will revolutionize commerce, change business models, and open the way to a new spurt of economic growth? Or is it or just an untethered extension of business as usual, a bust, a technological quagmire that will pull companies down and leave customers cold? The answer, for the moment, lies between these two extremes. Furthermore, the key future opportunity in m-business may lie in understanding the cross-industry potential and offering bundled value through partnerships across markets to increase customer reach and build loyal relationships.

While it is true that mobile commerce has been slow to develop for a number of reasons, many companies (more than two-thirds in our recent study) are using wireless Internet primarily to improve productivity and operational efficiency. In this article, we demystify the much-hyped "new wave of business," explain the reasons for the disappointment with its progress, describe how mobile technology is being successfully leveraged to enhance competitive advantage, evaluate the propensity for industries to adopt wireless technology, identify potential future opportunities, and raise guiding questions for firms considering m-business solutions. Through various examples, we provide managers with a sense of how to approach investments in m-business and what the likely payoff might be.

Demystifying the Hype and Explaining the Disappointment

We define m-business as the use of mobile hand held devices to communicate, inform, transact, and entertain using text, voice, and data via connection to public and private electronic networks. Mobility means fully portable, real-time access to the same information resources and tools that, until recently, were available only from the desktop (Kalakota and Robinson 2001). We focus on the distinctive aspects of m-business, namely, mobility and electronic networks.

Estimates on the growth of m-business have been both optimistic and pessimistic. Billing m-business as the next big disruptive technology, many Wall Street analysts had projected wildly optimistic scenarios. Projections on the growth of the m-business abound with high variance among them (as much as 100%). A frequently cited estimate suggests that by 2004, 130 million customers will be generating almost 14 billion transactions, yielding $200 billion in m-business revenue worldwide (*Strategy Analytics* 2001). By the same token, still earlier estimates had drastically underestimated its forbearer, the cell phone. In 1996, Dataquest forecast that there would be 100 million cellular phone users worldwide by 1999. The actual worldwide cellular user base in 1999 was close to 300 million.

The Hype All new technologies go through a hype cycle (Figure 1, *Durlacher 1999*) and m-business is no different in this regard. The hype surrounding m-business was largely driven by three factors: (1) the excitement about the technology and its capability, (2) the continuing growth of wireline e-commerce, and (3) the rapid adoption of wireless devices across the world. The combination of these three factors could yield a legitimate "white-space" opportunity--an unmet consumer need that previously could not be fulfilled--the

need to access information, connect with others and consummate transactions anywhere, anytime while on the move.

< Insert Figure 1 about here >

Some trends suggest that this "white-space" opportunity may merit the hype it is receiving. For instance, worldwide wireline e-commerce is projected to grow at a compound growth rate of 79% over the next three years from $1.2 billion in 2001 to $6.3 billion in 2004 (*Forrester* 2001). It is also projected that the number of mobile devices with Internet access will surpass the number of connected PC's in 2002 (*IDC* 2000). There is also a reasonable assumption that as more consumers become accustomed to buying on the Web, they would most likely exhibit a similar buying behavior on the wireless Web. These projections and assumptions suggested that wireless e-business could be the new wave of e-business.

The Disappointment The data during 2000 and 2001, however, reveal that m-business has fallen well shy of expectations, prompting some to view mobile e-business as untethered extension of traditional business. As e-commerce overall has hit a snag, so has m-commerce. The disappointment stems from seven key factors, leading towards the inevitable slide into the trough of disillusionment on the hype curve (Shankar 2001). These are: (1) lack of network capacity, (2) the lack of consumer demand relative to the technological capabilities, (3) mobile device limitations, (4) ubiquity of PCs, (5) incongruent business models, (6) lack of worldwide standards on wireless technology, and (7) failure of firms to understand customer value creation.

In its current form, the second-generation (2G) wireless Internet cannot deliver the speed and ease of use required for most revenue-generating m-commerce

applications. Although wireless technology is transitioning from 2G to third-generation (3G) technology, the generation gap between 2G and 3G is substantial in bandwidth and network capacity. For example, a two-megabyte file takes over three hours to download to a mobile phone on current technology, while it takes only five seconds on a full-fledged 3G network.

While enthusiasm reigns high for 3G mobile technology, customer behavior has not raced forward to use all the technological capabilities. Typically, customer behavior does not change easily or quickly due to new technology, particularly when its functionality is unique.

Mobile devices have their own limitations. The amount of real estate on a phone screen is very limited compared to that on a portable computer. The "Browse and Buy" metaphor, ubiquitous in wireline e-commerce, cannot be easily transferred to mobile devices. Furthermore, device manufacturers face the significant challenge of developing a new breed of 3G handsets within the next 18 months--ones that can juggle music, video, e-mail, and voice over three different radio bands. They must combine the wealth of applications on a computer with the roving versatility and footprint of a mobile phone. Given these challenges, there is some skepticism regarding the availability of fully functional, reliable handsets by the time the 3G networks are built in Europe.

The ubiquity of PC's in large markets such as the U.S. is a big barrier to m-business adoption, suggesting that consumers who have access to mobile Internet do not necessarily use their mobile devices to consummate revenue generating transactions. With larger display screens and faster transmission available in the home, office, and school within the U.S., the need for wireless use is diminished.

Another complication is the lack of worldwide standards on wireless technology. The lack of a worldwide mobile standard results in the need for tri-band phones and service from multiple providers across the world. In the U.S. alone, there are multiple technologies, resulting in several dropped calls as customers move from digital to analog networks.

An additional limitation related to financing of m-business services for consumers. Mobile device constraints on size of real estate on the screen all but eliminate a common form of revenue generation in the e-business world, banner advertising. New approaches such as mobile notification of sale or coupons are falling prey to the law of diminishing astonishment. Consumers are being asked to bear the brunt of the financing new applications through pay-per-use or pay-per-download revenue capture mechanisms. It is still to be determined if the consumer will be willing to be both a guinea-pig for new business models a financier of the new applications.

Finally, and most importantly, firms who really want to derive value from m-business will have to re-examine customer value creation. Service provides must recognize that true 3G bandwidth availability is as much as four years away and that m-business is not about creating a Web-experience on the phone. Rather, it is about providing customers with information or on-board applications they can use instantly to solve a problem more economically than alternative means. Until the required bandwidth is available, m-business providers will have to build their customer bases through services and applications that are simple, timely and location sensitive, more cost effectively than current alternatives.

How Winning Firms are Using m-Business

Amid the current realistic landscape of m-business, how are successful firms using m-business to their advantage? As was the case with e-business, organizations are leveraging mobile technology in one of three primary strategic ways: (1) to enhance current operational performance, (2) to increase product or service range and customer reach and loyalty, and (3) to create or address competitive threat from, new business models enabled by the new technology. Key decisions for most firms considering a new technology are where and how much to invest in the technology and how to align them with the strategic intent of the firm. Figure 2 shows a simple strategic framework to help make this decision. On the x-axis is the degree to which mobile technology supports or threatens the firm's existing business model, while on the y-axis is the expected degree of internal business transformation due to the new technology.

< Insert Figure 2 about here >

To illustrate this framework, consider possible m-business strategies for AOL and Yahoo. Hoping to increase customer loyalty, both AOL and Yahoo have increased their product ranges by providing wireless chat---*AOL Anywhere* and *Yahoo Mobile* are essentially mobile extensions of Instant Messaging (IM), a form of STM functionality available on their Web sites. The growth of IM, particularly among teens, who are also prolific users of chat sessions, presented an untapped opportunity for both the organizations. In examining the x-axis in greater detail, however, it becomes clear that the application of mobile technology to chat functionality will present more of a threat to Yahoo's business model than it will to AOL's. AOL's revenue model relies on subscription, while Yahoo's is based on advertising. Any advertising-based model is compromised in a mobile context due to device constraints. A mobile operator's (such as

Sprint) SMT revenue-capture model is pay-per-use. Yahoo could adopt a similar revenue-capture scheme, but would have difficulty differentiating itself from other existing offerings. AOL, on the other hand, could extend its subscription revenue-capture model by offering *AOL Anywhere* customers at a flat rate for mobile messaging services as part of their subscription selection. As we examine the y-axis, the ramifications become more significant. In essence, AOL does not require much business transformation to be able to offer *AOL Anywhere* as a differentiated alternative to a mobile operator's SMT service, while Yahoo would have to change its organization a lot to provide a differentiated offer. In this case, Yahoo's advertising-based business model is a core rigidity that would require significant management system changes to address the competitive threat from mobile technology.

B2E, B2B, and B2C Applications To analyze m-business strategies, we can extend this framework is to examine situations ranging from the simplest to the most complex in business to employee (B2E), business to business (B2B), and business to consumer (B2C) applications. In the case where mobile technology supports the firm's existing business model and will not require significant internal business transformation, firms are looking to leverage the technology to improve operational performance in one of two ways: (1) improve workforce productivity, and (2) improve supply chain management. To enhance operational performance, employee, customer, and business partner processes can be significantly improved through the integration of mobile technology. Currently, 40% of Fortune 2500 businesses in the US have equipped their workforces with wireless (*Forrester* 2001) tools and another 30% are considering rolling out wireless systems. Much emphasis is on business to employee (B2E) applications such as mobile office

(communications and access to corporate information), customer care (contract and transaction management) and operational productivity (asset/fleet management and inventory management), while most of the business to business (B2B) emphasis on mobilizing inter-organizational supply chains.

Applications of mobile technology in the business to consumer (B2C) space are looking to leverage mobile technology to: (1) increase customer reach, (2) increase product/service range, and (3) improve customer loyalty. A recent *IDC* study (*IDC* 2001) highlights that 29% or 361 firms across banking, insurance, manufacturing, transportation, telecom, media, utilities, health and government of firms already have a customer-facing mobile solution in place and that B2C emphasis is on applications such as customer self-service (mobile customer contact, query and order) mobile applications (personalized and location sensitive), and m-commerce (mobile billing, payment, and transaction).

Like in the case of Yahoo, the arrival of a new technology such as mobile Internet injects a significant amount of uncertainty into the business environment. In true white-space arenas, emerging companies seek opportunities to leverage new technologies to: (1) create a new white-space business, or (2) change the dynamics within an industry by creating a new business model that threatens incumbents. Much activity is currently being witnessed where emerging m-business companies are moving to capture advantage in the mobile-payment space through innovation, alliances and partnerships. According to Visa (Raffery 2000), cash spent worldwide on purchases totaling $10 or less represents $1.8 trillion per year. Mobile operators and start-up firms are targeting these purchases and thus threatening revenue-streams of incumbents such as banks and credit cards.

Every major mobile operator in the U.K. now has a banking license and they are rewarding customers for consummating their transactions via their mobile phones rather than through traditional means such as check-books or credit cards. This is but one example of where emerging companies are leveraging mobile technologies to create new and innovative offerings designed to create and capture value in white-space areas while "Bricks-and-Clicks" incumbents scamper to defend their positions and customer relationships in the marketplace.

Another useful way to view the strategic use of mobile technology is to analyze industry adoption or organization spending behavior. A recent IDC study (*IDC* 2001) of 473 firms across a number of industries in the U.S. and Europe revealed that the majority (69%) of them were focusing their m-commerce emphasis on B2E applications (Figure 3, option 2) (These figures are percentages of firms investing in these applications, hence, they need not sum to 100%). B2C m-business investments are aligned with improving reach and range while B2E investments stem from a strategic intent to improve operational performance. The strategic intent of creating or defending against new business models seems to be tied mainly to B2B investments, but there are some B2E and B2C applications as well. Based on these data, it appears that the main near-term emphasis for m-business is to improve performance, not derive revenues, and that this outcome will be achieved by first focusing on employees. Often, performance enhancing translates to cost savings which are more immediate and observable or measurable. Deriving new revenue frequently takes time, requiring customer education and changes in their behavior. Given the current economic downturn and the fact that many B2E

applications will tend to be customized solutions and thus are immune to the many issues surrounding 3G, these data should not be surprising.

< Insert Figure 3 about here >

Industry Propensity for m-Business Adoption What is less surprising is that different industries are placing different emphasis on B2E, B2C, and B2E investments based on their strategic intent (*IDC* 2001). For instance, industries such as insurance, manufacturing, utility, retail, healthcare, and government are focusing on performance improvement applications in the B2E space and, to a lesser extent, in the B2B space. Examples include:

- McKesson has armed 1300 warehouse workers with strap-on computers and rigged 31 distribution centers with wireless local area networks. This has resulted in an 8% increase in productivity, an 80% drop in incorrect items shipped, and a 50% drop in product shortages.

- The Ohio Hamilton county police department has launched project COP-SMART, enabling officers to generate and transmit electronic reports, access federal, state, and local databases for vehicle records, wanted persons, and criminal history information. The efficiencies of this system equate to the addition or reduction of 500 patrol officers.

- Federal Express' digitally assisted dispatch system eliminated the need to write down a million addresses a day, saving time, money and a lot of ink. Field services productivity was increased by more than 30% with this system.

- Trinity development and construction services is generating a cash flow windfall by leveraging wireless technology. When $300,000 of materials arrive on the site of a state highway project, a worker transmits receipt to headquarters, which in turn, generates a bill to the Ohio department of transportation. The result? Savings equaling 3% of revenue. Trinity anticipates that the system will pay for itself in about 6 months.

- Maryland's Price George's (PG) county hospital has implemented a wireless handheld tracking system for patient monitoring with the help of Ingenium Corporation, an information technology solutions firm. Physicians and nurses access patients' records from a portable and secure information system. By reducing expenditures on computer hardware and software and by expediting decisions through this mobile system, PG county hospital has achieved a 50% savings in costs.

Key industries seeking to increase their range and reach include banking, transportation, telecom, and entertainment and media. The primary emphasis here is on B2C wireless applications. Given the earlier discussion on mobile-payments and the push-pull between the banking and telecom industries in this regard, it is not surprising that these industries make the list. Furthermore, to generate the revenues needed to cover their infrastructure costs, mobile operators should provide greater content-based services to their subscriber base. Finally, for those things that cannot be delivered digitally, there is a significant opportunity to leverage mobile technology as a differentiator. Some examples are:

- Merita-Nordbanken's SMS-based "Balance and Transaction" banking service has increased to 200,000 transactions per month within one year of introduction. Furthermore, about 57% of all Merita's stock brokering activity is done via mobile technology for the true "day trader."

- Sonera launched a service in 2000 where customers can use their mobile phones in Helsinki to pay for parking. Sonera subscribers can also use their phones to buy soft drinks from vending machines. This leads to no or minimal increase in consumption, but does allow Sonera to benefit on the transaction cost.

- In the U.S., ExxonMobil has introduced a payment system called Speedpass at 2,800 gas stations. It is based on miniature short-range radio transmitter that gives your credit card details to the petrol pump, which bills the card without the need to insert in the pump or pay inside the station. McDonald's plans to use ExxonMobil's Speedpass payment system in more than 400 Chicago-area restaurants, following a successful test in nine outlets.

- As you walk into Wall street's Holiday Inn hotel, the technology recognizes you and sends a greeting message with your room number. You reply with the PIN given to you when you reserved. Upon arriving you reenter the PIN number that unlocks your door.

- Before July 1999, eBay users who weren't at their desks or out for lunch, so eBay introduced a service to alert customers via pager or cell-phone when someone bids on items they want. Three months later, eBay began implementing a two-way wireless system where ebayers can submit bids directly over their wireless device.

- In Singapore, residents flying out of the country simply place their thumb into a wireless device at the airport, which uses their print to register their absence electronically. In the U.S., airports are attaching Radio Frequency (RF) tags to suspicious looking baggage so that they can route it through more powerful scanning machines prior to loading on the aircraft.

Finally, the focus of emerging organizations on the development of new businesses to address white-space opportunities and the creation of new-business models to compete with incumbents is resulting in B2B, B2C and B2E applications. Consistent with expectation, key industries are those where mobile technologies are causing significant shifts within--if not complete recreation of--value chains. Telecom, media, and banking industries are high on that list. As with most cutting-edge arenas, the identification of trends and patterns becomes increasingly difficult given the dynamic nature of the business environment within which these firms operate. Nonetheless, there are a number of examples of emerging businesses chasing white-space opportunities:

- I-Prox , a London based start-up, is developing software for a "Buddy Service" that can notify users, when friends who have the service, are in the same area.

- A company called Sensatex/Lifelink is developing standards that would enable diagnostic medical information to be transmitted wirelessly from sensors embedded in smart clothing.

- Intuwave's m-network is experimenting with mobile auction scenarios such as one that finds the two taxis closest to your location and invites the drivers to submit estimated prices for your journey. If you accept one, the driver finds you by homing in on your mobile phone.

The key questions in each of these examples are, will consumers have sufficient enduring interest, and what is the revenue model?

There is also a lot of partnering activities between start-ups and incumbents to speed time to market for new offerings that leverage key attributes of mobile technology:

- Lightsurf, a U.S. start-up, has partnered with Eastman Kodak and Motorola to develop miniature digital wireless cameras that take photos that can be shared instantly over the Web.

- PacketVideo has partnered with Warner Brothers to deliver the company's legendary cartoon icons in the wireless environment. Marvin the Martian will welcome the users to "the entertainment device of the future."

- Networkcar sells a plug-in device that connects to standard-issue computer diagnostic ports. The device beams vital signs to the dealer who can remotely diagnose and spot potential trouble. The upside for dealers is increased customer loyalty.

Finally, the incumbents are not lying down when it comes to capturing white-space opportunities or address competitive threat. Here are some examples.

- International Paper and Motorola joined forces to create smart-packages--shipping boxes with embedded tags that emit radio frequencies to allow tracking. Smart boxes take the risk out of shipping valuables. The same RF tags can be used to notify suppliers when retailers are low on their product inventory, and distributors if boxes are tampered with.

- Paybox offers e-payment by wireless phone for items such as taxis or pizza delivery using electronic cash clearing through Deutche Bank, which owns 50% of Paybox. Paybox reached 100,000 consumers, 200 online merchants and 1,000 wireless merchants by the end of 2000.

- Ford and Motorola have jointly launched a new company called Wingcast. Wingcast will use positioning technology to notify emergency services automatically when a car's airbags deploy.

- In France, Mastercard allows for secure credit card payments over mobile phones. Working with France Telecom and Motorola, allows a secure transaction as the user types a personal identity number for validation.

With these three sets of activities, it appears that the new players or white-space opportunists are more concerned with the opportunity than they are with targeting a specific industry, while the incumbents in transportation, telecom, media and banking appear to be the most concerned about retaining their customers and addressing competitive threat from white space opportunists who are endeavoring to encroach upon their space.

Based on the IBM Global Services m-business client base, Figure 4 summarizes the emphasis placed by clients across the solution sets within the B2E, B2B, and B2C spaces by industry. Under B2E, three solution sets are predominantly used, namely, mobile office (e.g., messaging, remote office), customer care (e.g., sales force automation), contact management) and operational productivity (e.g., fleet management, authorization). The primary solution set in B2B applications is supply chain execution (e.g., order tracking, JIT, procurement), whereas, the two most commonly used B2C applications are customer service (e.g., call center, order processing, billing, payment) and information and commerce (e.g., location services, personalization and notification). This is highly consistent with IDC's study reported earlier. The fact that more solution sets (three) are being offered in the B2E space than in the B2B (one) and the B2C (two) spaces, suggests that the emphasis, initially at least, is on wireless solutions aimed at the employee. Furthermore, there is high correlation between the industry emphasis and solution type across both data sets. A synthesis of the comparative analysis is provided in Figure 5. Upon initial review, one might be tempted to conclude that those industries with emphasis across more than one space might be the most active investors in m-business. However, activity levels may not equal spending levels. For instance, a recent analysis of multiple spending projections by IBM suggests that spending will be largest in banking, retail, telecom, utility and healthcare.

< Insert Figure 4 >

The IBM client engagement data, however, do add value as they provides us another layer of specificity with respect to where industries are placing emphasis in the mobile arena. For instance, in Figure 4, we notice that two industries that are traditionally

highly correlated, banking and insurance, appear to be placing emphasis on B2C applications, but insurance is also placing emphasis on B2E. Both banking and insurance are placing emphasis on mobile office solutions, but the difference lies in the fact that insurance companies are placing primary emphasis on customer care in the B2E space as their workforce is highly mobile.

In sum, we can conclude that the bulk of the emphasis across industries appears to be focused on B2E solutions that emphasize improved operational performance. We can also see that mobile technology is impacting all industries in one way, shape, or form. At the very least each industry should be attempting to understand their relationship with this emerging technology by asking the questions that relate to the X and Y axes of Figure 2 discussed earlier: (1) to what degree does mobile technology support or threat our existing business model? and (2) what extent of internal transformation will be required to adopt mobile technology?. These two questions can reveal both the opportunity and threat that m-business could provide. A more detailed analysis of the organization's strategic intent and industry position can be leveraged to move through the layers of analysis outlined above to develop a strategically coherent justification for investment in one or more mobile solution sets across the B2E, B2B, and B2C continuum.

Where is m-Business Headed?

We believe that m-business will likely go through a maturity cycle similar to e-business, with firms first establishing a mobile presence, then moving through the security chasm to providing information based transactions, finally recognizing the new value propositions that the technology offers to enable revenue streams via commerce

transactions for new products and services. What will be different in the case of m-business is the speed with which this transition will occur.

The industry has the advantage of learning from the e-commerce experience. An emerging principles of e-business is that in an increasingly transparent supply chain, the power migrates to the customer. Besides, mobility will likely change customer interaction in unforeseen ways, placing traditional business models at risk (Kalakota and Robinson 2001). As Michael Dell once commented "If you are in a business that relies on fooling the customer, then prepare to go out of business." The majority of e-business innovation was cultivated within the corporate domain and then it seeped out into the consumer market, while in m-business, it is the early adopters in the consumer space that are pushing the envelope. The growth trends of m-business suggest that traditional distinctions between work and leisure are becoming increasingly blurred. Time and geographically bound interactions between consumers and companies are no longer acceptable and mobile devices provide the means for people to communicate, work and play irrespective of their location or the time they choose to interact. The battle is on for ownership of the customer relationship, and by association ownership of their wallets. As mobile gateway providers begin to exert control on the consummation of transactions, the threat of disintermediation of incumbents increases.

The m-business hype curve suggests that 2002 may be the year when realism is established and steady progress be made over the next two years. To emerge victorious from the trough of disillusionment, this slow but steady progress may largely come from: (1) the arrival of "Always-Connected" EDGE technology (also known as 2.5G) which minimizes the burden of access, (2) improved device design, (3) voice recognition, (4)

geolocation, (5) global standardization of service, (6) permission marketing, and (7) service outsourcing.

Cross-Industry Alliances In the mobile world of the future, it may be hard to determine where one industry begins and the another ends. From the B2C perspective, it could be argued that mobile Internet is more of a channel than a market and the key opportunity lies with the organization that understands how to set the cross-industry context to build loyal relationships with customers one at a time. Within the more lucrative and impactful enterprise space (B2E and B2B), winners have already began to implement mobile technology to create systems that enhance value and reduce costs. In the enterprise space, technology does not matter, but its benefits do. m-Business provides ample opportunities for revenue enhancement, cost avoidance and cost reduction to organizations. The key challenge, however, is that they do not become disintermediated even as they work feverishly to improve the efficiency and effectiveness with which they do what they always have done. An upstart organization, recognizing the disruptive nature of technology, might be simultaneously creating a whole new set of value propositions for the increasingly powerful consumer that renders the incumbent impotent. Strategy is about choices. With wireless, the number of choices facing any firm have increased significantly. The key may be figuring out what to do, but also what not to do in this highly volatile environment.

This realization raises several questions for further research. How will m-business impact business across industries? How many industries will be represented in a cross-industry context? Which industry will be dominant? What will the value chain for that industry look like? Who will control the chokehold within that value chain?

Traditional strategic analyses may not be as effective because, in a mobile context, power shifts even more dramatically to the customer who demands cross-industry value propositions that are simple, personalized, timely and location based.

Finally, as mobile technology becomes more tightly woven into our social and business fabric, it will bring with it a new concept of how we live and work that might have far-reaching implications for the foundations on which our existing mental models reside.

What Should Firms do about m-Business?

Firms considering adoption of and investments in m-business technology should ask the following questions before making their decisions. The answers to these questions can provide useful directions for the firm's mobile e-business strategy.

- *Have the firm's competitors firms invested in m-business technology? If so, where and how?*
- *Have firms in complementary industries invested in m-business technology? If so, where and how?*
- *How large or significant are m-business opportunities or threats in the firm's space?*
- *To what extent does mobile technology support or threaten the firm's existing business model?*
- *What degree of business transformation is required to implement a wireless solution within the firm?*
- *What should be the strategic thrust in mobile technology for the given opportunity or threat (operational efficiency, range and reach, or new business model)?*

- *Who is the primary audience for each wireless application (partners, employees, or customers)?*
- *Will the investments in m-business solutions (people, process and technology) pay off in a reasonable time frame?*
- *Are there profitable opportunities to forge cross-industry alliances to create new value bundle for customers?*

Conclusion

In conclusion, m-business has not lived up to its hype for several reasons ranging from inadequate demand to failure to understand customer value creation. Wireless applications, however, are now starting to take hold. The majority of investments have been on improving operational performance primarily in the business-to-employees context. More investments are now being made in improving product and service range and customer reach and loyalty. Industry adoption of mobile e-business is not uniform. Certain industries, by the nature of their products or their customers, have different levels of willingness to embrace mobile commerce, but the big winners are as yet unknown.

In this changing landscape of m-business, doing nothing is an unacceptable option for firms. While firms ponder over m-business investments, the issue is the speed of adoption, not whether to adopt.

The suggested strategic approach and the examples of firms successfully using m-business can provide an understanding how mobile technology will impact a firm's business model and organization. An understanding of where monies are being spent in m-business in the industry as well as in complementary and competitive industries may be valuable as mobile technology's core value proposition of anything, anywhere,

anytime is hacking at the root of the industry-segmented mental model. The future opportunity for m-business truly lies in the cross-industry context rather than within the context of any given industry. Cultivation of the capability to recognize and act upon cross-industry value networks aimed at constantly enhancing customer value may need to be a core competency of successful firms in the wireless world. While firms need to grab the low-hanging fruits of wireless now, they also should change the way they look at how they do our business in the future mobile environment characterized by cross-industry coordinated value bundles for customers.

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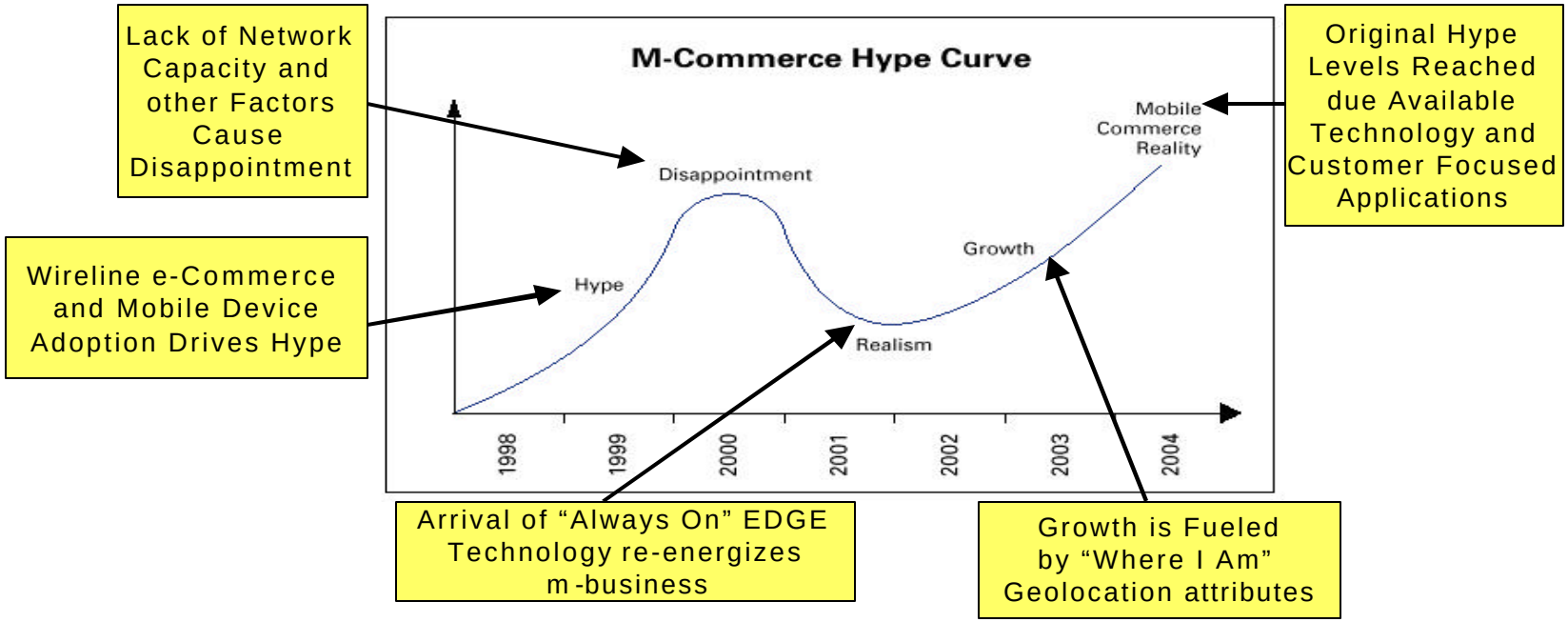
Lack of Network Capacity and other Factors Cause Disappointment
Wireline e-Commerce and Mobile Device Adoption Drives Hype
Original Hype Levels Reached due Available Technology and Customer Focused Applications
M-Commerce Hype Curve
Mobile Commerce Reality
Disappointment
Growth
Hype
Realism
1998
1999
2000
2001
2002
2003
2004
Arrival of "Always On" EDGE Technology re-energizes m-business
Growth is Fueled by "Where I Am" Geolocation attributes

Figure 1

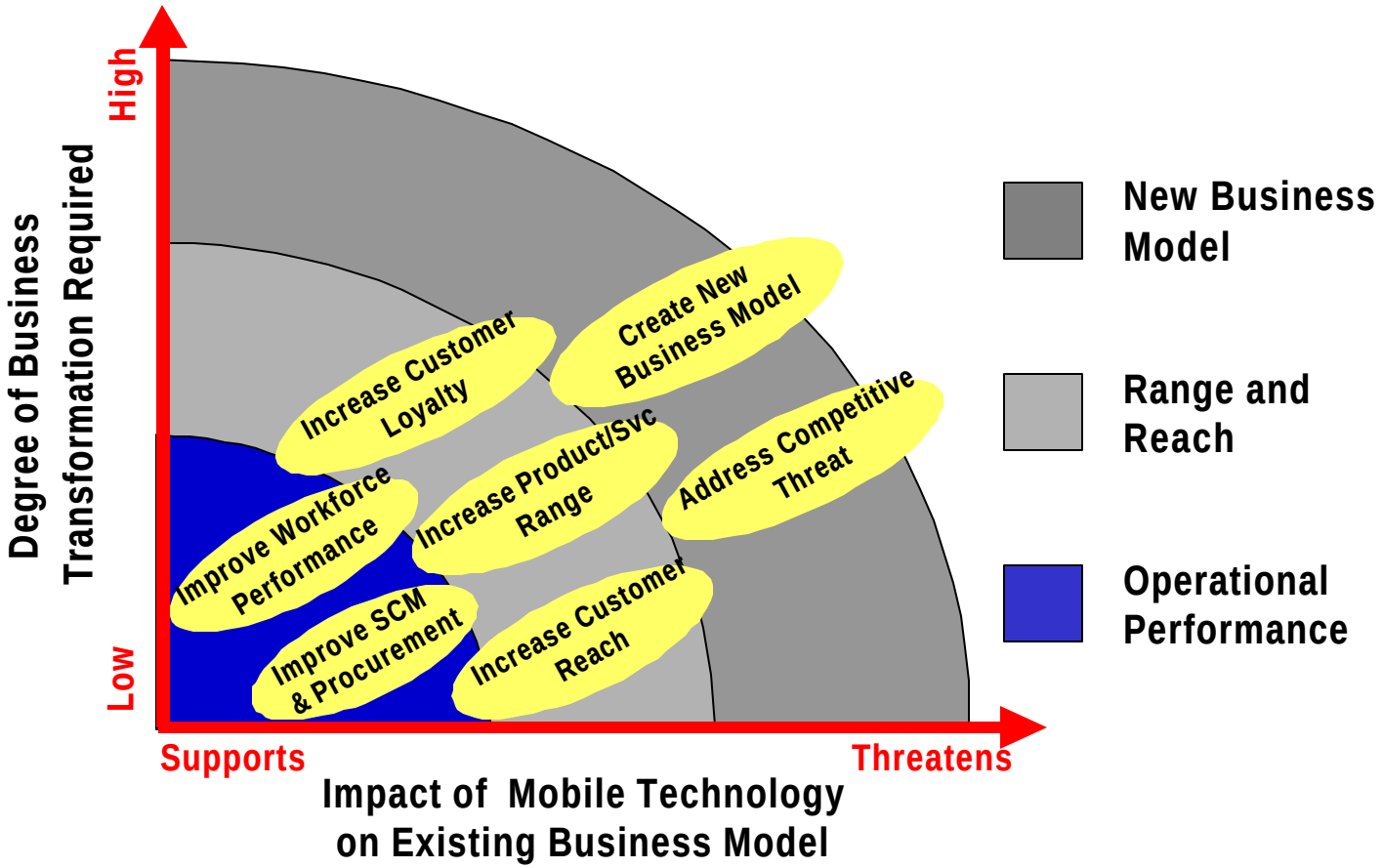
Degree of Business Transformation Required
High
Low
Supports
Threatens
Impact of Mobile Technology on Existing Business Model
Increase Customer Loyalty
Create New Business Model
Improve Workforce Performance
Increase Product/Svc Range
Address Competitive Threat
Improve SCM & Procurement
Increase Customer Reach
New Business Model
Range and Reach
Operational Performance

Figure 2

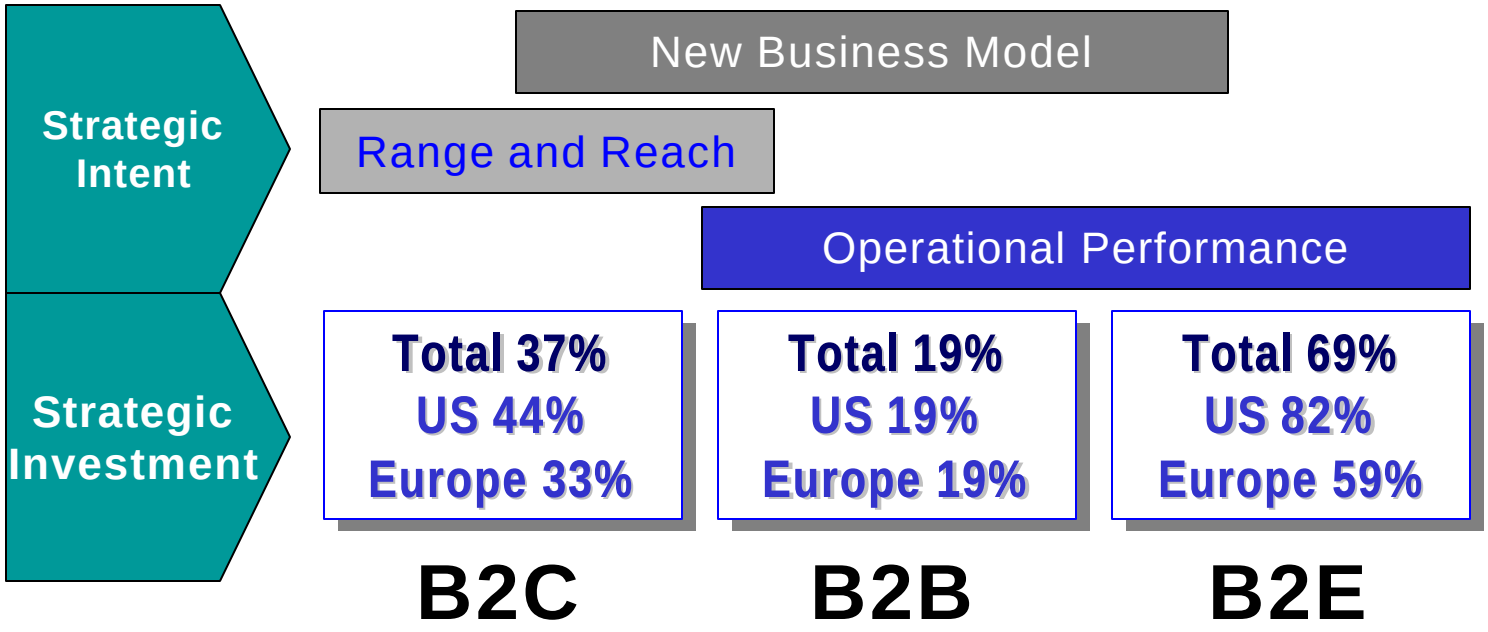
Strategic Intent
Strategic Investment
New Business Model
Range and Reach
Operational Performance
Total 37%
US 44%
Europe 33%
Total 19%
US 19%
Europe 19%
Total 69%
US 82%
Europe 59%
B2C
B2B
B2E

Figure 3

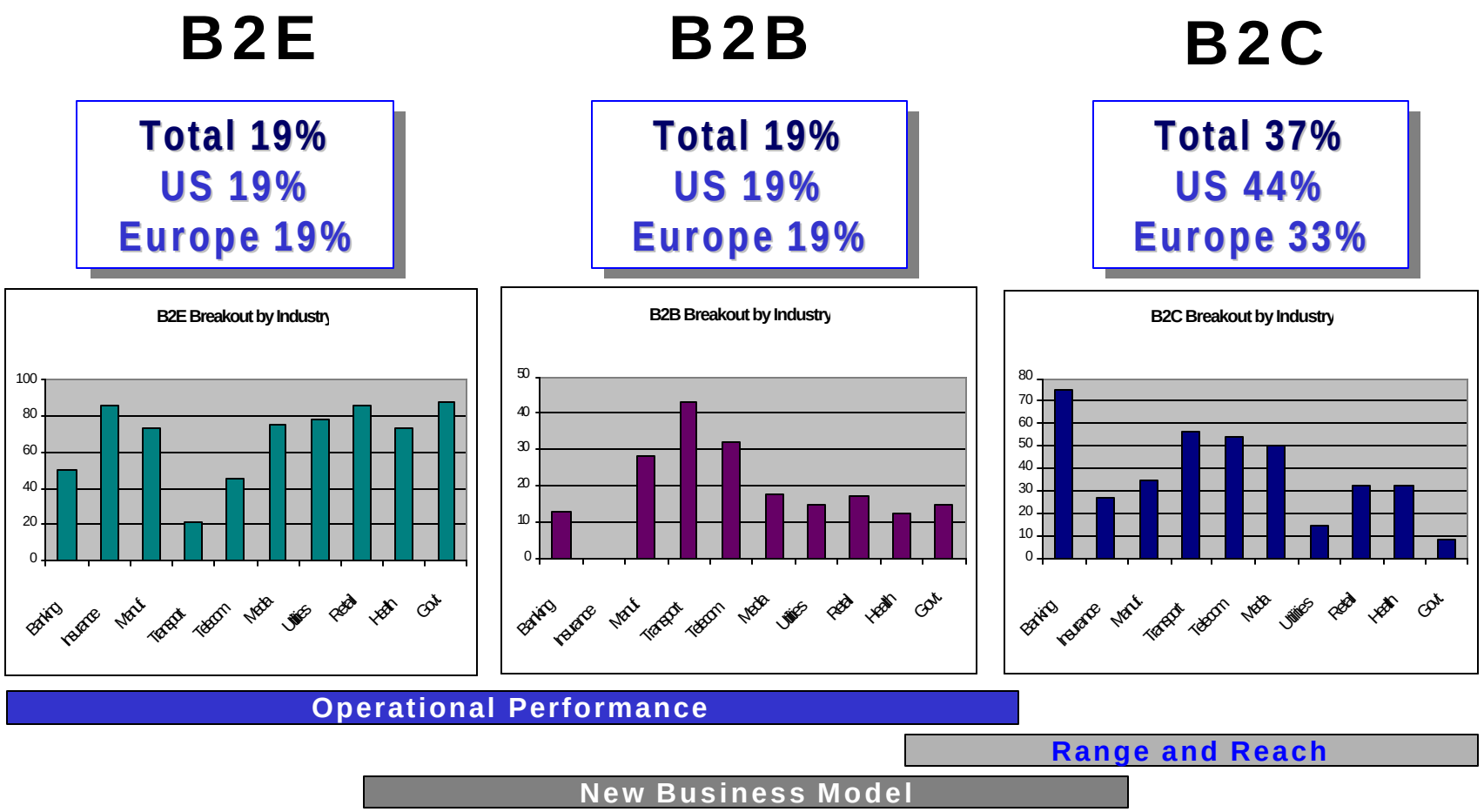
B2E
Total 19%
US 19%
Europe 19%
B2E Breakout by Industry
100
80
60
40
20
0
Banking
Insurance
Manuf.
Transport
Telecom
Media
Utilities
Retail
Health
Govt.
B2B
Total 19%
US 19%
Europe 19%
B2B Breakout by Industry
50
40
30
20
10
0
Banking
Insurance
Manuf.
Transport
Telecom
Media
Utilities
Retail
Health
Govt.
B2C
Total 37%
US 44%
Europe 33%
B2C Breakout by Industry
80
70
60
50
40
30
20
10
0
Banking
Insurance
Manuf.
Transport
Telecom
Media
Utilities
Retail
Health
Govt.
Operational Performance
Range and Reach
New Business Model

Figure 3

Importance of Mobile Internet Solution Sets By Industry

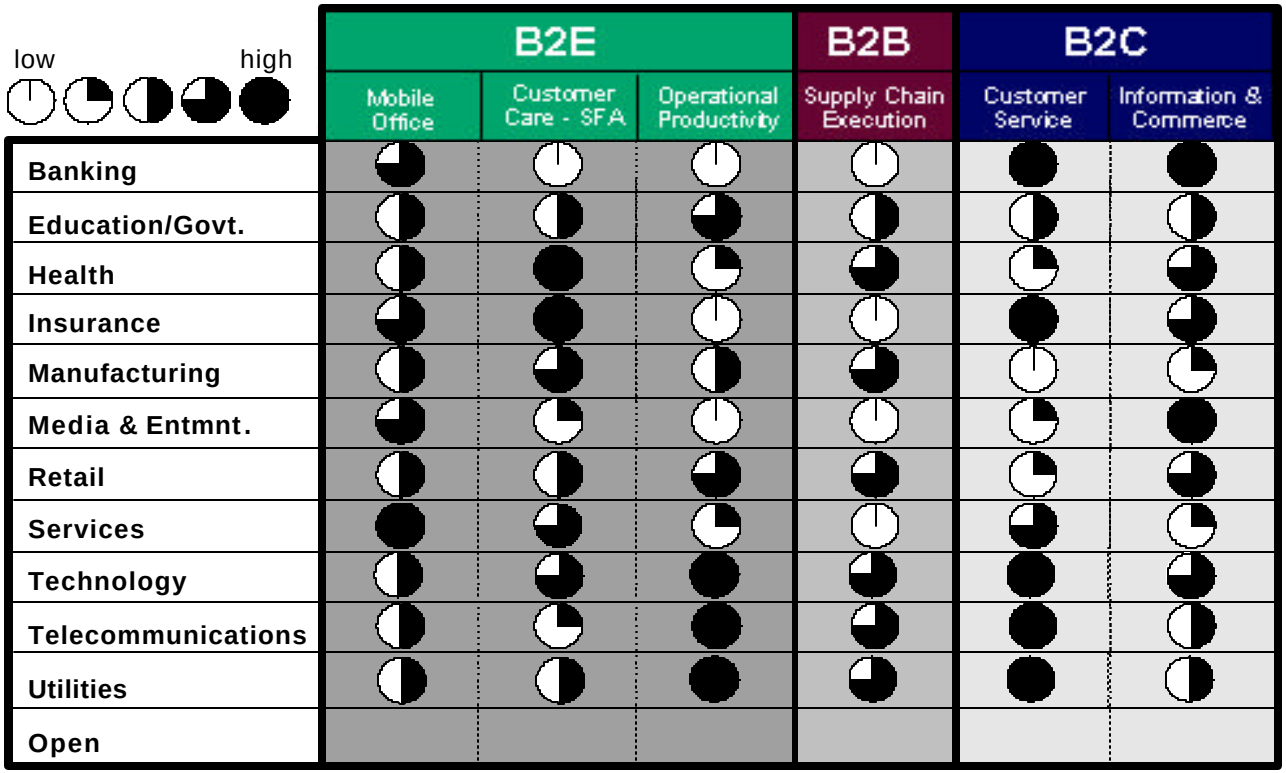

Figure 4

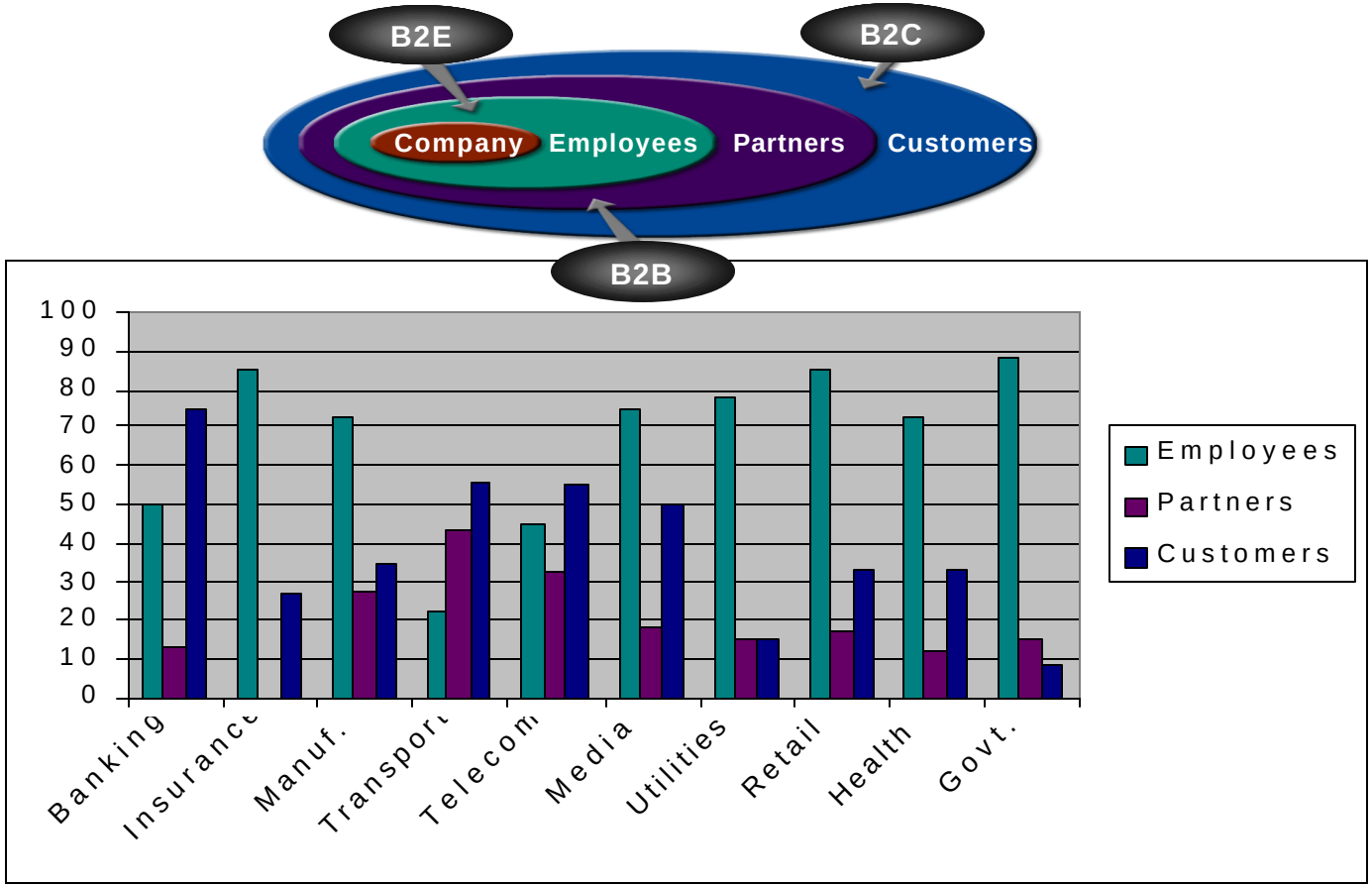

Figure 5

Source: Gartner 2000, IDC 2001, IBM Synthesis

IBM's Service Productivity Enhancement (B2E)

Customer service is a cornerstone of IBM. IBM's 7000 North American service personnel respond to more than 3,600,000 customer service requests per year 24 x 7, seven days a week, and 365 days a year. Most customer service operations are based on work allocation systems that use a call-in support center. Given the size of this operation and its reputation as a technology leader, IBM has been innovatively leveraging technology to meet increasing customer expectations, while lowering service delivery cost.

As early as 1984, IBM formed a joint-venture with Motorola to develop a two-way device network dispatching system that allowed customer engineers to receive calls, access accurate and timely information on the job and parts, and update the status of the job upon completion. During 1984-89, this venture resulted in an estimated savings of $800 million, 30 minutes per day of customer engineer's time, 81% reduction in calls to dispatch, and a 41% decrease in dispatch personnel.

Building on the success of this original wireless system and leveraging new advances in technology, IBM has continued to make its service processes mobile-enabled. In 1994, it introduced the Mobile Solutions Terminals (MoST) to its service personnel. These devices allowed access to human resource applications, business records, online training, and service manuals, but required tethered access. IBM made this system untethered in 1997 with the introduction of the Research In Motion (RIM, also known as Blackberry) 800 device and followed it by introducing RIM 857 in 2001. The RIM device is a powerful hand-held computer with address-book, calendar, task list, and memo-pad features. Unlike other handheld products, however, the RIM device includes an integrated handheld wireless modem and an internal antenna. This wireless data network keeps the handheld always connected to the user's desktop e-mail, the Intranet and the Internet, resulting in an average savings of 45% in service costs.

Because the total cost of ownership for a RIM device ($2000) is only about a fifth of that for a personal computer ($9,700), the value proposition of mobile e-business is extremely compelling, resulting in savings of about $54 million in hardware and maintenance costs alone.

Today, over 7000 IBM employees use a custom RIM solution that is integrated with Lotus Notes email and database--where users have access to over nine gigabits of up-to-date relevant information. Field service personnel can receive service requests, contact the customer, access customer order and track parts, update service records, complete field activity reports, and close service requests all on this one device. Needless to say, the application of mobile technology in this particular B2E application has been very successful.

Ethicon's Operational Efficiency Improvement (B2E and B2B)

Ethicon, a division of Johnson & Johnson, is the world's leading supplier of sutures and other surgical supplies. It provides more than 3,500 products to some of the largest hospitals all over the world. Daily restocking of surgical supplies in emergency rooms and operating labs is critical to these institutions and to the lives of their patients. In the past, these institutions relied on time-consuming manual methods of checking inventory, registering supply needs, and placing orders.

Ethicon estimated that nearly half of all healthcare distributors still placed orders via the fax or the pager, while another 40% were conducted over the phone. These labor-intensive processes were both time-consuming and error prone. Compounding these problems was the fact that many hospitals lacked the information technology infrastructure to automate their supply reorders and the cost of building such an infrastructure was prohibitive.

Given these constraints and the compelling need for hospitals to maintain their inventories, Ethicon determined that providing an affordable, proactive, wirelessly-enabled simple order entry system for its products would clearly differentiate the firm from its

competitors. With this vision, it took less than six weeks for Ethicon to develop a handheld mobile solution called E-sy Scan that allowed users to: (1) scan items bar code in the surgical supply closet, (2) enter the quantity of items needed directly into the device, and (3) confirm the order and wirelessly transmit them to Ethicon's order-entry system. This "mobilized" process allows supply managers to instantly relay orders to Ethicon, saving customers significant time, while reducing the possibility of errors inherent in the manual maintenance of inventory. Ethicon first tested this wireless service in November 1999 at the Manchester Royal Infirmary. Following its success, Ethicon installed this system in 14 other hospitals over the next 16 weeks. It plans to launch similar wireless initiatives in more than 500 sites across Europe by the end of 2002.

Ethicon's mobile system demonstrates how value can be created for both the customer and the provider by the application of wireless technology. Ethicon's customers report an 80% reduction in the time it takes to place orders, a 10% reduction of supply manager's daily work time, access to bulk purchase savings, and a streamlined supply chain management process. As for Ethicon, it expects a $30 million increase in orders from its wireless customers in the first year alone. Not bad for a solution that took less than six weeks to develop!

Delta Airlines' and British Airways' Customer Retention Improvement (B2C)

In today's hotly contested airline industry, improving customer retention has emerged as a key strategic imperative and worldclass customer service programs designed to achieve this end have become prominent.

The Delta Experience With major hubs in Atlanta, Cincinnati, Dallas/Fort Worth, New York City and Salt Lake City, Delta Air Lines has consistently been a top performer in the hyper-competitive US airline industry, largely on the strength of its innovative customer service programs.

Delta's customer service strategy, based on continuous customer feedback, is focused on providing the customer the information they need, when they need, and at the place they need. This strategy is challenging because it requires the firm to continually innovate and implement flawlessly at the same time. The advent of wireless technology opened the door for a new generation of innovative customer information delivery vehicles including Web-enabled wireless telephones and PDAs. Delta saw strategic value in taking advantage of this new technology to maintain its leadership position in the airline industry.

Delta knew that many of their customers had high time sensitivity. Whether it is a flight delay or a meeting that overruns, passenger's plans often change which inevitably results in customer downtime. Furthermore, these changes rarely occur when the passengers are at their desks. Delta recognized that they were the first entity to know when a plane would be delayed and recognized that if they could capitalize on wireless technology to position themselves as a reliable purveyor of high-pedigree, timely information, they would secure a strong strategic position. Thus, "Delta Wireless" was born.

The first Delta Wireless application was developed and deployed in December 1999 to deliver flight information to a Web-enabled telephone and a Palm VII device. This was followed by flight schedule and flight itinerary applications. The Delta Wireless solution was then beta tested among a group of 50 Delta frequent fliers. After improvements from the Beta test, the system was rolled out in March 2000.

The program has resulted in significant benefits including increased customer satisfaction, reduced cost of customer service, and more efficient allocation of customer service resources. Because customer retention has been strengthened because it is less expensive to keep existing customers than to acquire new customers, Delta's customer acquisition costs have been

reduced by this system. Beyond cost avoidance, on the efficiency side of the equation, Delta Wireless is reducing costs within the customer service infrastructure. By providing customers with alternate information delivery channels and more options for customers to serve themselves in real-time, the cost associated with manning call-centers is improved due to fewer phone queries. This, in turn, allows Delta to better allocate its customer service resources by offering more tiered and targeted levels of service.

Since its introduction in March 2000, Delta Wireless has experienced continuous growth in usage. Arrival and departure information has proven to be the most heavily used application and is t used during inclement weather. The result--more loyal customers and maintenance of a leadership position for Delta Airlines in a "dog-eat-dog" industry!

The British Airways Story On the other side of the Atlantic ocean, British Airways (BA), was not to be outdone by Delta. In 2001, for much the same strategic reasons as Delta, BA began to offer a range of mobile Internet services to travelers. BA views the wireless channel as one of the most useful service-centric components of its coordinated customer relationship management (CRM) strategy.

The difference with BA's service is that its offerings go beyond simple access of real-time flight arrival and departure information (probably buoyed somewhat by the ubiquity of the wireless standard, GSM, in Europe). The BA system is the first in the world that allows passengers to check seat availability and to check-in and to select a seat via a graphical seat map on their wireless access protocol (WAP) enabled phone. Time sensitive travelers can check-in using the pictorial seat selection tool on the phone, arrive at the airport, collect their boarding pass from a self-service kiosk in a matter of seconds, leave their baggage at the fast bag drop, and go straight to the boarding gate, saving valuable minutes and hours. Despite the low-key

marketing of their WAP and PDA services, BA has experienced positive monthly growth in usage of the mobile channel. Also, despite the over-hyping of WAP in Europe, about 25% of BA's frequent flyers claim to have a WAP-enabled handset and to use WAP services such as traffic and rail and flight information on a weekly basis. BA and Delta have set the bar for other airlines to emulate. In an industry where customer loyalty reigns supreme, the anytime, anywhere attributes of wireless technology have provided these two firms with credible sources of differentiation.

Sources: *IBM* client database, estimates.