Realizing the Embedded Mobile Opportunity Together

Mobile and non-mobile industries will need to collaborate to enable an ecosystem of connected devices

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Executive Summary

Mobile telephony has transformed the lives of more than four billion people. Now there is great interest and excitement that embedded mobile connectivity, in everyday devices, will deliver similarly transformative benefits to consumers, businesses and society as a whole: smart metering solutions can lead to more efficient energy consumption by individuals; transport solutions can provide eco-friendly route planning and also help to manage traffic congestion; and, remote monitoring technologies for healthcare promise to deliver more cost effective and resource efficient healthcare, while offering individuals and care givers vastly improved control over patient life styles. In the last year, embedded mobile has climbed up the business agenda in both mobile and non-mobile industries. Now, what tangible actions are early-adopter consumers and corporations expecting of the mobile industry?

Between November 2009 and February 2010 Accenture and the GSMA conducted two primary research studies on the embedded mobile market. The aim of the overall study was to assess the market opportunity and the main barriers to its development. Interviews were conducted with technologically innovative corporations[1] and early-adopter consumers[2]; four vertical segments were prioritized amongst corporate participants—automotive, healthcare, energy and digital home.

Early-adopter consumers see a bright future for new connected devices

Consumer respondents showed a high level of interest for services that rely on wireless connectivity built into everyday devices (e.g., appliances, health equipment and entertainment devices) as distinct from handsets.

Seventy-six percent agree that most electronic devices they purchase in the future will connect to the Internet. However, 54 percent consider devices that currently connect to the Internet immature in terms of usability and available commercial propositions.

Innovative corporations are committed to embedded connectivity but struggling with the business model

Eighty-nine percent of corporate respondents reported that mastering the issues around networking technology is critical to their organization's future.

Sixty-three percent of corporate respondents reported that finding the right business model is the main hurdle in launching embedded mobile solutions. As one corporate respondent commented, "no one is going to pay $49.95 per month for each device

they have connected. There needs to be tailored pricing plans for rich intelligent services that comprise multiple devices from multiple manufacturers." Participants also acknowledge that new business models are an important industry issue. Issues around standards choices (53 percent) and interoperability challenges (52 percent) ranked as the next two most important barriers to commercializing their products and services.

Innovative corporations want to work with Mobile Network Operators (MNOs) for new embedded services

Almost 70 percent of corporate respondents consider MNOs to be desirable partners as the world migrates from standalone embedded mobile devices, like the Amazon Kindle, to systems such as integrated care management solutions for diabetics, for example. These corporate respondents expressed a desire for MNO assistance with commercial and technical issues, with tailored pricing plans, device management and billing as the top three requirements. However, while corporate respondents rate MNOs as the best potential partner to develop and deploy new embedded services, only 36 percent considered MNO services to be excellent today.

There has been significant progress in enabling standalone networked devices with innovative pricing plans in the areas of digital picture frames, e-Readers, and consumer telematics (transport solutions). According to corporate respondents and MNOs, the next frontier that has even greater promise for scale and value-added service revenues is the market for systems. This involves multiple devices working together to deliver new and innovative solutions. An example of this would be a home health monitoring service that integrates data from multiple sensors and home appliances to provide a holistic report on the health and well being of an individual.

An open standards approach will encourage innovation and is necessary for systems solutions

MNOs are uniquely positioned to enable the ecosystem for this new connected world with many core capabilities already in place—customer relationships, service plans, billing, device management, provisioning and activation, etc. To address the interoperability and standards challenges, MNOs have an opportunity to focus on finding open solutions both at the edge, where consumers connect a multitude of devices onto the network, and at the application orchestration layer. Both the industry and consumers would benefit from an easy route for developers to apply MNO assets in designing applications that orchestrate services across multiple embedded mobile devices.

Progress toward this goal also depends on partners having a share in the market upside. MNOs should also consider what commercial models will encourage innovative corporations to invest with them.

Progress requires a shift from enabling standalone devices to enabling an ecosystem of connected devices

The traditional Machine-to-Machine (M2M) industry model for standalone devices is starting to deliver lower cost and faster time-to-market solutions. However, to realize the full potential of the embedded mobile market the mobile industry needs to shift its thinking from enabling standalone products to enabling an eco-system of connected devices and cross-industry business models.

I. What expectations are early-adopter consumers, corporate-and MNO-innovators signalling?

We looked at the ecosystem from three distinct groups in the value chain to gain insights into market demand and supply side factors.

Early-adopter Consumers (Tech Forwards[3]): these early adopters of Internet services and Internet-enabled devices represent about 30 percent of the population over 18 years of age and provide a window into demand for new networked based products and services.

Corporate Innovators (Next Movers[4]): these innovators are from outside the traditional mobile industry (large companies and start ups). They include device makers, retailers, technology enablers and other services firms. These companies are looking to differentiate their offerings, drive new revenue streams and improve efficiencies and customer service through new networked devices.

Mobile Network Operators: these companies provide the wireless connectivity, enabling platforms and, to varying degrees, the end-to-end service, billing and support for new networked products and services.

Through our interviews, we looked for ideas that could shape the embedded mobile industry and developments that interview participants considered necessary for the market to take off.

Eighty-nine percent of corporate respondents indicated that innovation in embedded mobile technology is very important to their organization's competitive future.

Research Methodology

All interviews with Corporate Innovators were conducted between November 2009 and February 2010.

Corporate Innovators (Next Movers): We conducted hour long telephone interviews with 65 executives across four verticals: automotive, energy, healthcare and digital home. The Corporate Innovators represent a cross-section of players in each of the verticals with participation from North America, Europe and Asia. Most of the telephone interviews were conducted by GfK Group under the direct supervision of Accenture.

MNOs: We conducted hour long telephone interviews with 12 business unit heads from MNOs that are responsible for M2M and embedded device initiatives in their respective companies. This included representation from Asia, Europe and North America. These interviews were conducted by Accenture.

Early-adopter Consumers (Tech-Forwards): We conducted 1,005 online interviews evenly distributed across 10 countries: United States, United Kingdom, Germany, France, Italy, Spain, Japan, China, India and Brazil. To eliminate age and gender bias, the sample for each country was evenly divided between men and women and between the 18-to-30 and over-30 age groups. Respondents were screened to select only those who own at least four networked devices and used four Internet software services within the last month. This process resulted in about a 30 percent incidence across online respondents. The online interviews were administered by Light Speed Research.

II. Demand is high among early-adopter consumers for new networked services

Consumer respondents expressed high interest in new types of networked services that involve connecting every day devices to the Internet. More than 80 percent of the survey respondents agreed that networked devices will save them time, simplify their lives, bring them closer to friends and family, and make their lives richer and more enjoyable.

We gauged the interest of consumers in several innovative concepts that involved interoperable devices and services.

Automotive System: Fifty-seven percent of all consumer respondents said they would be interested in embedded mobile systems for automobiles; among owners of automobiles, the level of interest was 62 percent. These systems could transmit a car's GPS position to a website to locate the car in case of theft, or give users access to automotive performance data including acceleration rates, braking patterns, engine speed, fuel flow and mileage over a website, which drivers could review.

Systems for Home Management: Seventy-two percent of all consumer respondents said they wanted to learn more about a home energy management system. Fifty-five percent of them expressed interest in a home security system with embedded wireless.
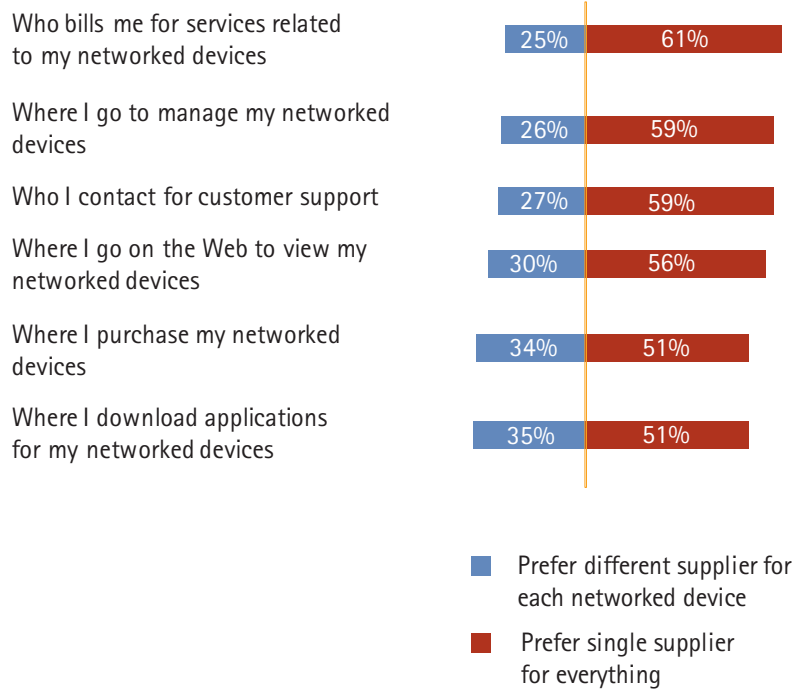
Care Giver System: Forty-one percent of all consumer respondents indicated interest in such systems, with 72 percent interest among those in an elder care giver role. These systems include devices that connect to one another and the Internet to monitor a person's vital signs, level of physical activity, and physical conditions. The system concept also includes devices that monitor the environment for safety hazards, enabling the caregiver to perform remote monitoring via a laptop or a smart phone. Alerts can be sent out in case of an emergency and the service integrates voice communications to allow instant contact at the touch of a button.

Consumer respondents favored pricing plans that trade off lower up front charges for a higher monthly payment. And, a majority expressed a clear preference for a single supplier over multiple suppliers for billing, device management and customer support functions associated with different devices.

Despite the market exuberance, 60 percent of consumer respondents believe that it will take several years before connected devices become truly useful to consumers. This view reflects interoperability challenges in the current generation of devices.

Preference for Bundled Services from a Single Supplier

Who bills me for services related to my networked devices
25%　61%

Where I go to manage my networked devices
26%　59%

Who I contact for customer support
27%　59%

Where I go on the Web to view my networked devices
30%　56%

Where I purchase my networked devices
34%　51%

Where I download applications for my networked devices
35%　51%

- ■ Prefer different supplier for each networked device
- ■ Prefer single supplier for everything

III. Strategic initiatives by corporate innovators are driving supply-side momentum

Among corporate innovators, the inclusion of wireless connectivity is moving from being viewed as a feature to something that is an essential element in their product and services strategies. Eighty-nine percent of corporate respondents indicated that innovation in embedded mobile technology is very important to their organization's competitive future. One appliance manufacturer commented that "it will be launching many more appliances, home energy managers, and thermostats this year that can interface with smart meters and qsmart grid systems."

Corporate respondents are increasing their investment in R&D related to networking devices and planning. They are allocating these resources to address the emerging opportunity because they see it as an important way to differentiate their products and capture new revenue streams.

The following chart highlights that corporate respondents are mainly focused on large-scale, near-term opportunities in the automotive and energy sectors; in the healthcare and digital home setting, much of the activity is geared to learning about market dynamics and on trials to test new service concepts. Their ideas are also beginning to crystallize around multi-device systems for next generation opportunities in each of the verticals.

	Automotive	Energy	Healthcare	Digital Home
Immediate embedded mobile opportunity	Navigation systems and other telematics for OEM and aftermarket eCall in Europe and similar projects in other countries that address public safety concerns	Deployment of Smart Meters in conjunction with electric utilities	Pilots with large healthcare providers related to eldercare and chronic care—often in an institutional setting	Dominated by stand alone networked entertainment products (e.g. e-Readers, digital photo frames) Few systems opportunities at present—current home gateways are based on DSL or cable technologies
Next generation embedded mobile opportunity	Work with individual auto manufacturers to develop next-generation "connected car" with integrated suite of on-board performance, safety and entertainment devices and services	Leverage Smart Meter as home gateway that supports additional devices and services Extend Smart Meters to water, gas and other metered applications	Provide infrastructure that supports highly diverse family of medical and fitness devices and services that must work together in consumer setting	Create a cellular gateway into the home either as a standalone product or as an extension of the Smart Meter, for example. Facilitate interoperability across devices by bringing in-home devices into the content management platforms used for mobile devices

IV. MNOs can be important business partners for systems solutions

Two thirds of corporate respondents believe that the shift to systems from standalone networked devices will make MNOs more valuable business partners. This is based on the belief that MNOs have the customer relationships, billing capabilities and control over the underlying connective fabric of the broader ecosystem.

Thirty-six percent of corporate respondents rated MNOs as the most capable partner for bringing new networked devices and services to market. By comparison, other potential partners scored less: 34 percent were in favor of specialist M2M network enablers, 27 percent opted for system integrators and 17 percent selected wire line telephone companies.

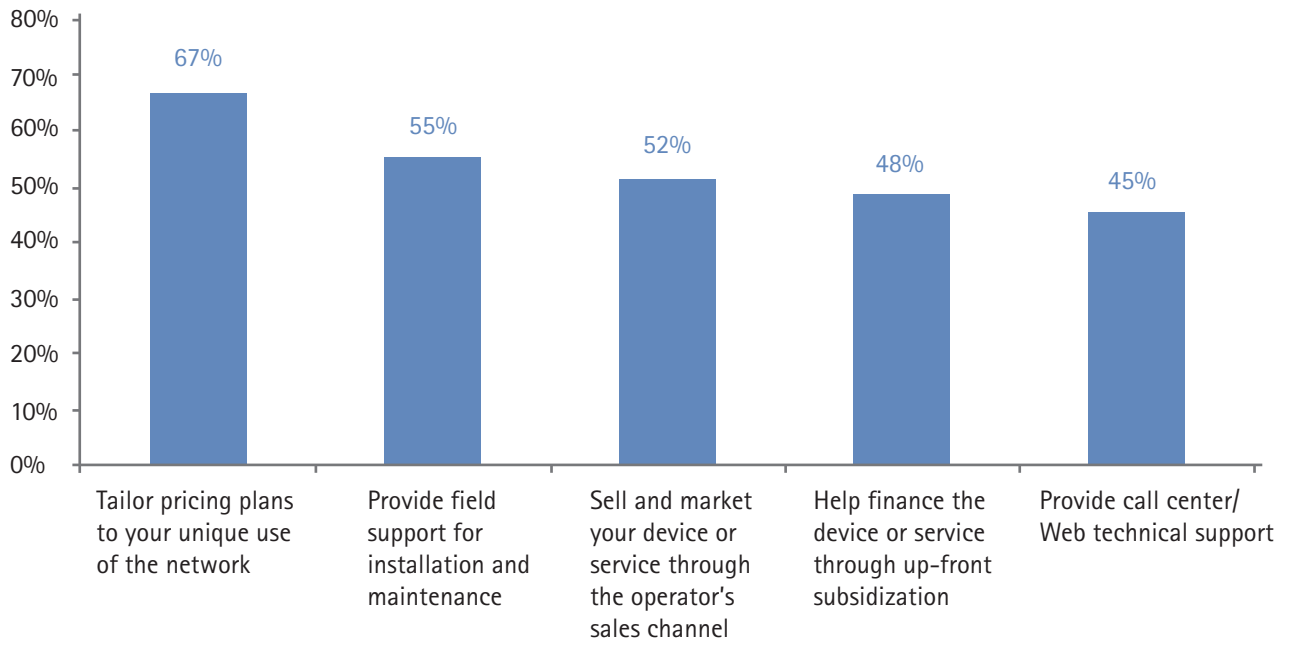There is clearly room for improvement and for MNOs to distance themselves from competitors. Corporate respondents desire much more support from MNOs, specifically in the area of technology enablers and business support services. The following tables show the kinds of business and technical support they are seeking from MNOs.

Tailored pricing plans, field-force support and sales through MNO channels are the top three business areas where corporate respondents see opportunities for collaboration with MNO partners.

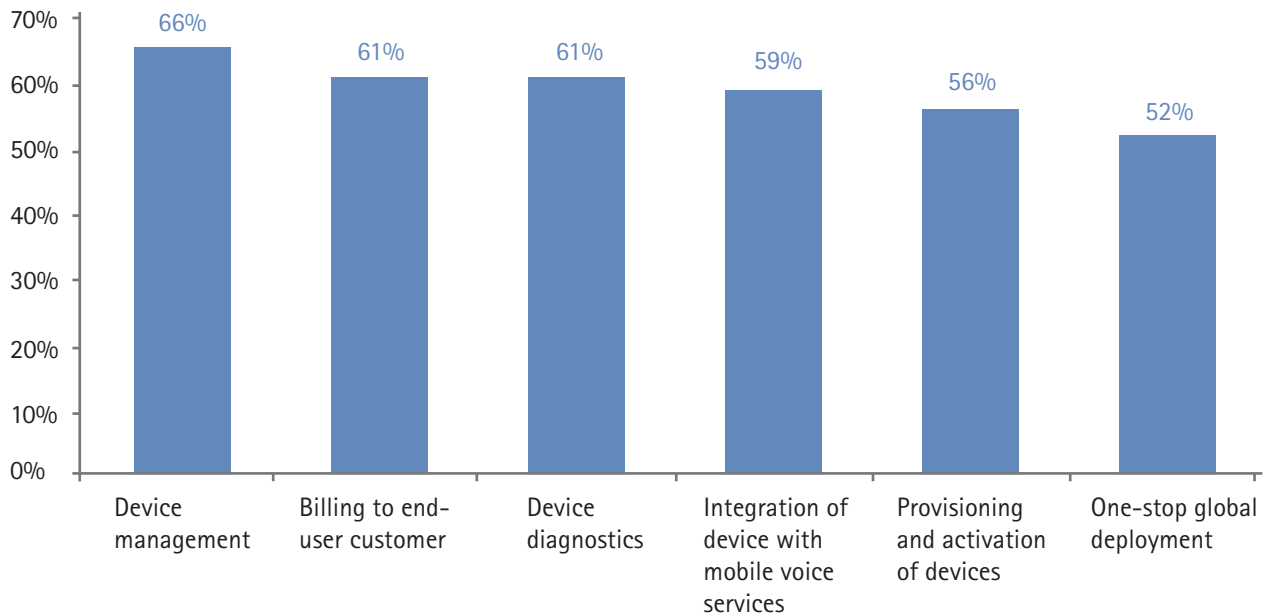Device management, end-user billing and device diagnostics support are the top three topics highlighted in regard to technical collaboration. However, the spread of ratings suggests there is much wider scope for technical collaboration between non-mobile device manufacturers and MNOs.

Thirty-six percent of corporate respondents rated MNOs as the most capable partner for bringing new networked devices and services to market.

Interest Levels in MNO Business Support Services by Corporate Respondents

67%	55%	52%	48%	45%
Tailor pricing plans to your unique use of the network	Provide field support for installation and maintenance	Sell and market your device or service through the operator's sales channel	Help finance the device or service through up-front subsidization	Provide call center/ Web technical support

Interest Levels in MNO Technical Services by Corporate Respondents

66%	61%	61%	59%	56%	52%
Device management	Billing to end-user customer	Device diagnostics	Integration of device with mobile voice services	Provisioning and activation of devices	One-stop global deployment

V. MNOs view embedded mobile as an important growth opportunity for their future

Many MNOs have identified embedded mobile as core to their business and several have already established separate embedded business units. Indications are that many others are planning to follow suit in the next year. One MNO commented that "embedded is not big in terms of revenue at this point in time, but strategically, it is hugely important because that's where we see an increasing portion of future revenues. Obviously, it is very important (as a means of) offsetting some of the revenue decline in traditional telecom services." Another observed that "we will soon have more embedded SIMs than regular SIMs."

The near-term priority for many MNOs appears to be on large-scale and high-profile opportunities. These include: consumer telematics systems for the automotive sector; network connectivity to support smart metering systems; and, connectivity services for suppliers of high brand profile consumer electronics devices. These are among the few embedded market opportunities that have sufficient scale to warrant significant time and investment by the MNOs today. While these markets promise significant new revenues for MNOs, opportunities are often characterized by competitive bidding situations, resulting in downward pressure on price for connectivity. Furthermore, many buyers of connectivity wish to protect their customer relationships and do not provide MNOs with the opportunity to offer value added services.

Many of the other embedded segments such as digital home and healthcare are fragmented and have received less attention because they are perceived to involve more complex technical and business solutions. In the case of healthcare, for example, MNOs are learning about industry business structures that are new to them. In parallel, they are conducting pilots to test new service concepts and learn about business models that involve patients, care givers and third-party payers. The general consensus among the MNOs that we interviewed is that the issues around interoperability and who pays for services will push the development of these markets several years into the future. Population-wide solutions are also less likely to succeed if government and commercial payers perceive that m-Health solutions are fragmented.

Universally, the MNOs expressed a strong interest in deriving revenues for value added services beyond connectivity. For MNOs, this tends to be challenging in the automotive, utility and branded consumer electronic device areas, where some of the corporate respondents have strong brands and have the direct customer relationship. By comparison with these segments, there was recognition among the MNO respondents that when the digital home and healthcare markets do emerge in earnest they will be better positioned to drive value-added services revenue in these two areas.

VI. Multiple hurdles to overcome before the embedded mobile market can reach full potential

Fifty-four percent of consumers indicate that different devices that connect to the Internet don't work together as well as they should. They also expressed concern about safety and privacy. Seventy-seven percent worry that devices connected to the Internet would expose them to computer viruses and other malware and 76 percent are concerned that their personal data could fall into the wrong hands. Fifty percent think that customer support would fail to solve technical problems as they occur for these new systems.

As illustrated below, corporate respondents and MNOs cite business model uncertainty, closely followed by standards issues and interoperability, as the biggest barriers to the growth of the embedded market.

The business model for an embedded product is different and much more complex than most corporate respondents are accustomed to. Making the transition to alternative models is difficult not only because it calls for new ways of thinking, but because it involves multiple parties that all want some share of the revenues and that have differing tolerances to sharing risks and revenues. As one mobile device maker commented, "finding the right business model is a problem we see all over the world. It is difficult to make an end-to-end business case, primarily because most companies underestimate the complexity of connecting devices over a network that is very fragmented."

The costs associated with manufacturing and operating embedded devices also emerged as an area of concern. For many corporate respondents in price-sensitive markets, it is currently very difficult to formulate a value proposition that justifies the added cost. According to one retailer, "the biggest obstacle is that the customer has to perceive value to justify the cost that networking adds to an appliance."
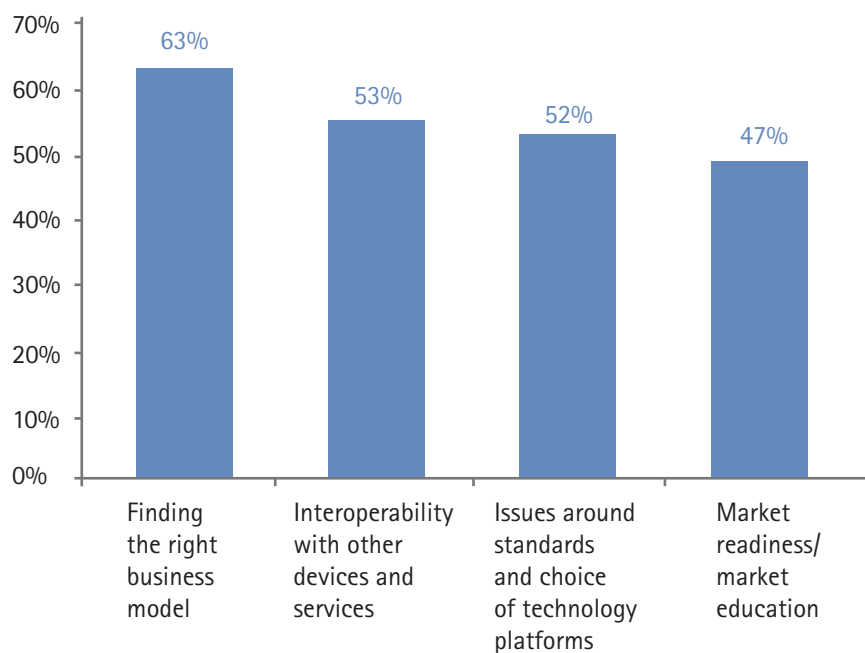
Given the newness of the embedded market, it is not surprising that there is a concern about standards. The early pioneers were focused on getting their products to work, and used whatever protocols were convenient to the immediate task. Corporate respondents reported that they now find themselves in the difficult position of adapting their own efforts to accommodate an eclectic set of standards. Most feel that things will resolve themselves and that standards will emerge de facto rather than through a more formal standard-setting process. A number of corporate respondents pointed out that the multiplicity of standards not only inhibits interoperability, but also adds to the cost of development and increases product costs.

The issue of locking into a vendor-specific standard was highlighted by one energy management company which commented, "there are no accepted standards for energy efficient technology platforms. In other words, all of the different vendors for energy management systems all have their own protocols."

A different perspective was evident in the healthcare arena where a systems approach relying on device interoperability is a key component of the overall service offering. One healthcare company summarized the challenge as follows—"Let's say you have a blood pressure cuff, a weight scale and a blood glucose meter. The blood glucose meter might work with the blood pressure cuff, but not with the weight scale. You find yourself using what you can instead of what you want to. When you talk about technology platforms you have the same sort of issue going on with CDMA, GSM or Bluetooth. Every company has different standards and different radios and different platforms."

Most Challenging Hurdles to Commercializing Networked Products

Bar chart showing percentages:
- Finding the right business model: 63%
- Interoperability with other devices and services: 53%
- Issues around standards and choice of technology platforms: 52%
- Market readiness/market education: 47%

VII. It is critical that business model and interoperability issues are resolved

In a very short amount of time embedded mobile has moved from being viewed as a tertiary market opportunity focused on one-off enterprise deals (e.g., fleet management, industrial automation) to a truly strategic growth engine for device vendors and MNOs. There has already been significant innovation in standalone embedded mobile products, such as the Amazon Kindle, that few would have imagined a few years ago.

Corporate respondents highlighted the fact that they are now looking to MNOs for business models that allow them to share in the upside as the industry takes off. The mobile industry needs to shift its thinking from enabling products to enabling an ecosystem. This will open the door for attractive new service plans that reflect the consumer's desire for solutions that truly make their lives better and that they will be willing to pay for.

Some corporate respondents are also looking to the mobile industry to establish an Open Standards framework for interoperability that allows full service solutions to be built by integrating different vendor offerings in a plug and play manner.

VIII. The mobile industry needs to enable a wider ecosystem

There is a recognition among MNOs, corporate and consumer respondents that the next big wave of growth will come from systems solutions—the networking of many devices into an integrated system whether it be for the home, car or for an individual's personal health. This requires a level of openness at both the device connection point (e.g., where everything plugs in) and at the applications orchestration level where information from multiple devices is merged; this is virtually nonexistent today.

Frustrated by the pace of standards development and interoperability challenges, a few corporate respondents are taking it upon themselves to bundle multiple devices to create a system (e.g., for diabetes management). While these result in costly and niche solutions, they represent a huge leap forward from standalone networked devices. However, they are unlikely to be as affordable and attain the scale necessary to reach mass-market consumers and deliver wider societal benefits.

The mobile industry needs to take collective action to attract organizations from adjacent markets with an approach that addresses concerns about fragmentation, lack of scale and single supplier solutions. This can best be achieved if the industry shifts its outlook from enabling standalone products to enabling a wider ecosystem of connected devices and cross-industry business models.

For more information on embedded mobile technology or to download an electronic version of this study, please visit www.accenture.com/embedded or scan the 2D barcode.

About Accenture

Accenture is a global management consulting, technology services and outsourcing company, with more than 176,000 people serving clients in more than 120 countries. Combining unparalleled experience, comprehensive capabilities across all industries and business functions, and extensive research on the world's most successful companies, Accenture collaborates with clients to help them become high-performance businesses and governments. The company generated net revenues of US$21.58 billion for the fiscal year ended Aug. 31, 2009. Its home page is www.accenture.com.

About the GSMA

The GSMA represents the interests of the worldwide mobile communications industry. Spanning 219 countries, the GSMA unites nearly 800 of the world's mobile operators, as well as more than 200 companies in the broader mobile ecosystem, including handset makers, software companies, equipment providers, Internet companies, and media and entertainment organizations. The GSMA is focused on innovating, incubating and creating new opportunities for its membership, all with the end goal of driving the growth of the mobile communications industry. Its home page is www.gsmworld.com.

[1,4] In prior Accenture studies, these companies are referred to as Next Movers. They include device manufacturers from outside the mobile industry and have a strong competency for product and service innovation.

[2,3] Interview participants are drawn from Accenture's periodic study of consumers who are early adopters of Internet services and Internet enabled devices. This category of consumers is also referred as Tech Forwards in other Accenture publications.