

Thinking Horizontally and Vertically A Better Way to Approach Mobile Innovation in the Developing World

The GSMA Mobile for Development team¹ was delighted when Omidyar Network, a leading social investor, told us it wanted to increase its investment in developing world mobile technologies and asked for assistance in understanding the landscape of innovative products, services, and platforms. Organizations working in this area frequently talk in terms of sectors or “verticals”—for example, agriculture or healthcare—but, like most technology investors, Omidyar Network thinks horizontally and looks for versatile technology platforms that can scale to meet a wide range of user needs. The resulting research project forced the GSMA to take a different perspective, one that has changed the way it looks at mobile initiatives in the developing world and has helped guide the formation of a newly launched Mobile and Development Intelligence program.² Through an online community, this program aims to map out a complete landscape of developing world mobile products and services, and to provide free access to a wide range of market data and analysis.

This article describes a new framework for thinking systematically about mobile initiatives in the developing world from both a sector (or vertical) perspective and a technology (or horizontal) perspective. This is based on a review and categorization of more than three hundred products and services, which between them account for hundreds of millions of users, customers, and beneficiaries. The

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		Verticals (sector based)							
		Cross-sector	Learning	Health	Agriculture	Micro-entrepreneurship	Financial inclusion	Governance & transparency	Corporate & NGO use
Horizontals (technology based)	Application level	Call centers	<i>Scope of products and services included later in this research</i>						
		Interactive content							
		Peer-to-peer content							
		Push content							
		Data-collection tools							
		Inventory-management tools							
		Mobile payments							
	Device level	Niche devices							
		Handsets							
		Networked devices							
	Network level	Infrastructure							
		Software							

Table 1. Systematic Framework

aim was to get a full picture of the projects currently in operation beyond just the most talked-about sectors and initiatives, and to understand the true scope of innovation by uncovering patterns in the needs addressed and the nature of the mobile products and services being deployed. This framework was used to map out horizontal and vertical patterns of innovation and to look at the potential to generate revenue and, hence, to achieve financial sustainability. The findings and resulting recommendations are described below.

BACKGROUND: THE BREADTH OF MOBILE INNOVATION
IN THE DEVELOPING WORLD

In just over a decade, mobile networks have become the predominant infrastructure in the developing world. Mobile phones are the most popular and widespread personal technology on the planet.³ There currently are more than five billion mobile connections in the developing world, and this number is still growing fast;⁴ in Africa, for example, more than 40 percent of people living on a low income now have access to a mobile phone.⁵ The arrival of mobile connectivity has had a fundamental impact on the daily lives of these populations and will continue to do so.

This explosion in mobile access has given rise to an incredible breadth of innovation in the developing world. Much of it is commercially driven, but there is also a huge number of nonprofit and government initiatives as well as social ventures with both financial and social objectives. The projects in this sample originated in 40 countries and covered every continent.⁶ As the innovative use of mobile continues to expand globally, a few hotspots are emerging—for example, India, the U.S., Kenya, and South Africa. While some products and services are developed in one country and deployed in others, there is an increasing pattern of locally developed solutions that support local needs.

THE VERTICAL PERSPECTIVE

A vertical, sector-based view of developing world mobile markets seems to be the default approach; in fact, many of the GSMA's own Mobile for Development programs work from a vertical perspective, including healthcare (mHealth), agriculture (mAgri), and learning (mLearning).⁷ This approach is logical, since a relatively narrow set of vertically linked user needs or problems often forms the starting point for innovation. Mobile solutions can be very complex to deploy and scale, so focusing on a single sector, at least initially, can help to simplify the requirements for the solution. Donor funding strategies are also commonly designed to meet specific macro-objectives for having a social impact within a given area of need, as illustrated by the Millennium Development Goals.⁸

Mobile-based solutions address a comprehensive range of needs for developing world populations, touching on almost every aspect of life—healthcare, learning, livelihoods, personal finances, citizenship, even socializing and entertainment.

Looking across the 300-plus products and services sampled for this research, 40 distinct “use cases” emerged relative to the problem or need being addressed. Although there may be some overlap, these use cases can be grouped reasonably easily into seven distinct areas of need or verticals (see Table 2, following page). Many of these verticals are already represented by established donor programs, conference themes, and industry language and areas of expertise.

Learning	Health	Agriculture	Micro-entrepreneurship	Financial inclusion	Governance & transparency	Corporate & NGO use
<ul style="list-style-type: none"> • Literacy and numeracy • Financial literacy • Technology literacy • Language learning • Workforce training • Entrepreneurial skills and career development • Job advice and connection • Teacher training and support • Classroom tools and resources 	<ul style="list-style-type: none"> • Health education and promotion • Reminders for patients to take medicines • Remote patient monitoring and diagnosis • Healthcare micro-payments • Data collection tools for workers • Health worker training and capacity building • Medical supply chain optimisation • Drug verification • Specialised medical devices 	<ul style="list-style-type: none"> • Helplines for advice and trading assistance • Broadcast and narrowcast advice and weather updates • Crop insurance and agricultural financial services • Fair trade compliance tools • Weather monitoring on base stations • Agricultural supply chain management tools 	<ul style="list-style-type: none"> • Business advice helplines • Job posting and trading platforms • Training and skills development • Store / SME management tools • Inventory ordering and management tools 	<ul style="list-style-type: none"> • Money transfer • Airtime and prepaid services • Bill payment • Bank account management • Micro-credit • Micro-savings • Micro-insurance • Corporate payments • Mobile commerce • Social payments 	<ul style="list-style-type: none"> • Governance and democracy monitoring tools • Lobbying tools • Enhanced government service delivery 	<ul style="list-style-type: none"> • Prepaid airtime vending systems • Surveying tools • Fieldworker communications tools • Crisis monitoring tools • Supply chain management tools • ICT training resources for small organisations

Table 2. Use cases by vertical

A HORIZONTAL PERSPECTIVE

Let us return to the original challenge. While this vertical approach is valuable—and often a natural starting point—it also is important to take a cross-cutting, technology-based perspective on how products and services addressing each of these use cases and verticals actually work. How can we think systematically about mobile innovation for developing countries, and not just within vertical silos?

The primary challenge in taking this kind of perspective is one of simplifying complexity. Mobile innovation can occur across three different technology layers; at a network, device, and application level. Within each of these layers, services often use a range of technologies in parallel. A service using one-way SMS messages to deliver information to a large audience on a basic handset works very differently than a service using SMS messages to deliver peer-to-peer social networking to the same group of users. On the other hand, mobile payment platforms using USSD authentication have a lot in common with other payment platforms using SMS authentication.

Some interesting findings emerged when each product and service was examined in more detail in terms of the supporting technologies, systems, and platforms being used. Despite the diversity of use cases, some clear patterns emerged in the way the services actually work. To take a relatively simple example, call centers with trained experts are used for remote patient monitoring and diagnosis (e.g., Telenor Teledoctor 911 in Pakistan⁹); to provide agricultural help for farmers (e.g., M-Kilimo in Kenya¹⁰); and to give business advice to small business owners (e.g., Babsha Jigyasha in Bangladesh¹¹). The use cases and expertise (or content) are diverse, but the underlying call center models are very similar. This is illustrated in Figure 1.

Similar logic was applied across the full range of mobile products and services that were included in this research. This led to the identification of 12 product and

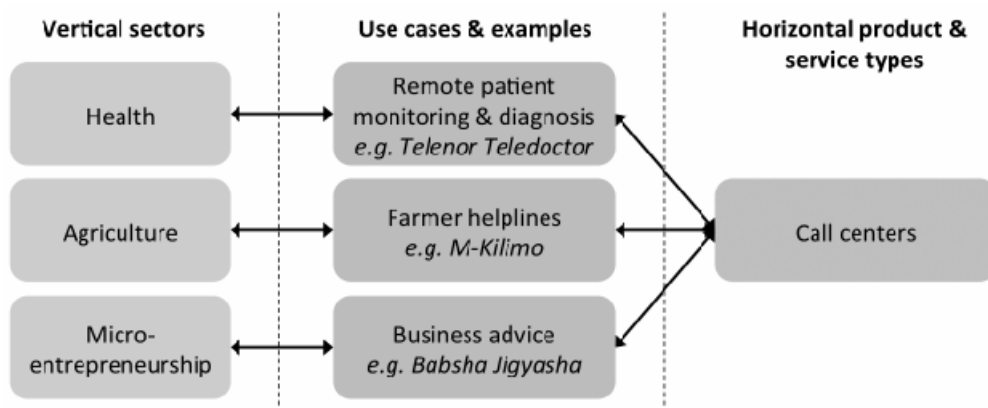


Figure 1. Translating sector verticals into horizontal product and service types

service types across three technology layers, as shown in Table 3 (following page).

The first seven product and service types—the “Application level”—cover services and applications delivered via mobile handsets. This is where most of the best-known “mobile for development” initiatives fall. All of these product and service types are already commonly used terms. However, grouping them together highlights their distinctive characteristics and provides a more complete horizontal perspective on how mobile technology is being leveraged in the developing world—without getting stuck in too much technical complexity. As shown in the text box “Service Mapping Examples,” it is possible to take horizontal or vertical approaches to service delivery at the application level.

The next three product and service types, the “Device level,” cover the mobile devices used to access these kinds of services and applications. Mobile handsets are predominate here in terms of sheer number of devices; however, handsets and networked devices were excluded from this research for simplicity (there are thousands) and because they can’t be categorized in terms of verticals. However, a number of niche devices designed for specific developing world uses were included in this research. While most mobile devices are horizontal by nature and capable of supporting solutions across a range of vertical areas of need, some niche devices take a vertical approach, for example, smartphone attachments for eye examinations (EyeNetra).¹²

“Network-level” products and services were also excluded from this research, for similar reasons. They could be seen as another set of product and service types; two types are illustrated here, but they could be broken down further. Some of these areas are covered by GSMA Mobile for Development programs, such as Green Power for Mobile¹³ and Community Power from Mobile.¹⁴

	Definition	Example	
Application level	Call centers	Individualized feedback to a user's query from a human expert via a voice call	Remote monitoring and diagnosis of patients far from clinics
	Interactive content	Automated interactive text or voice content. May be delivered via Interactive Voice Response (IVR), SMS, Unstructured Supplementary Service Data (USSD), apps, or the mobile web	Language training delivered via three-minute voice sessions using IVR; SMS- based market price information platforms
	Peer-to-peer content	Social networks and posting systems—content is primarily user generated	Job posting platforms for informal and service workers
	Push content	Content pushed to the user; may be broadcast or narrowcast	SMS awareness messaging around HIV/AIDS, weather updates for farmers
	Data-collection tools	Tools for fieldworkers to gather data via mobile and submit to a central database	Applications for nurses to collect and view patient data in the field
	Inventory-management tools	Tools for managing, tracking, validating, forecasting, and ordering physical inventory	Applications for shopkeepers to monitor stock levels and order new stock from suppliers
	Mobile payments	Mobile wallets, payment gateways, and a wide range of payment-based services	Mobile money wallets; micro-insurance policies purchased using mobile money
Device level	Niche devices	Range of specialized devices, some with mobile functionality, others to supplement mobile handsets	Vending devices for prepaid airtime, eye examination devices, mobile payphones
	Handsets	Primary mobile device with voice, SMS, and perhaps data functionality	Basic handsets, feature phones, smartphones
	Networked devices	Devices providing mobile data connectivity for Internet access	Tablet computers, mobile broadband modems
Network level	Infrastructure	Hardware owned or leased by the mobile network operator to provide coverage, capacity, and core network functions	Base station equipment, core network equipment, tower sharing companies, energy service companies
	Software	Software that manages the network and customer accounts, and provides a range of services	Billing systems, network management, mobile money platforms, mobile identity systems

Table 3. Horizontal product and service types

Service Mapping Examples at the Application Level

Single product or service type and vertical: Mobilink SMS for Literacy is an **education** initiative that brings literacy and math skills to women and girls in Pakistan's rural areas. Along with instruction from local teachers, learners receive push content—regular SMS messages—to complement the course. The program is now scaling to 100 centers.

Horizontal approach: Mobenzi Researcher is a **data-collection** tool designed for fieldworkers to gather various types of information (cross-sector). It works with feature phones and smartphones, and allows mobile surveys to be designed and deployed through a web portal. Surveys can include multiple-choice data, free text, images, and GPS coordinates.

Vertical approach: KSL provides rural Indian farmers—many of whom have limited literacy—with high-quality agricultural information and services. Using a special SIM card, customers gain access to a call center staffed by trained farming experts and receive frequent **push content** in the form of voice messages with relevant content.

INSIGHTS ON INNOVATION PATTERNS

Integrating this horizontal perspective with the more established vertical perspective provides a more systematic way to classify and landscape mobile innovation, using the matrix shown in Figure 1. Using this approach, each initiative was classified according to both the vertical need area(s) served and the product and service type(s) used.

Although most initiatives could be mapped clearly to a single sector, some projects are mapped against multiple sectors and are therefore counted more than once on the “heat map” shown in Figure 4. However, other projects were not designed with any specific sector in mind; they were mapped separately as having a “Cross-sector” focus. While the vast majority of projects clearly mapped to a single product or service type, some used different product and service types in tandem. In such cases, each component was mapped separately. This approach was used to create the innovation “heat map” shown in Table 4.

Clearly this mapping isn't exhaustive and there are many more initiatives out there, but it does allow the reader to step back from the noise and make some high-level observations about where innovation seems to be happening.

There is strong activity in vertical sectors such as healthcare, agriculture, and financial inclusion, where numerous donor-driven programs, conferences, and thought-leadership activities have helped to stimulate an active ecosystem. Learning and micro-entrepreneurship are also increasingly hot innovation areas, with a growing number of projects being launched in both. Interestingly, though, a significant portion of new projects are cross-sector in nature, which highlights the importance of taking a horizontal view, as such initiatives don't necessarily get

	Cross-sector	Learning	Health	Agriculture	Micro-entrepreneurship	Financial inclusion	Governance & transparency	Corporate & NGO use	Total
Call centres	1	0	7	8	2	0	0	0	18
Interactive content	6	15	20	16	7	1	3	2	70
Peer-to-peer content	11	1	2	6	7	0	1	1	29
Push content	1	1	7	6	1	0	1	4	21
Data collection tools	18	0	16	1	0	0	0	5	40
Inventory management tools	0	0	8	1	3	0	0	1	13
Mobile payments	2	3	4	2	0	112	1	1	125
Niche devices	2	1	6	1	2	0	0	0	12
Total	41	21	70	41	22	113	6	14	328

Table 4. “Heat map” of developing world mobile products and services

supported or picked up by vertically focused programs and media coverage. In fact, given that the GSMA’s knowledge is largely based on its own vertical programs, this sample may even be biased against cross-sector initiatives or less well established verticals.

Nearly all the types of products and services have use cases within a broad range of sectors. This indicates strong technology and platform commonalities between vertically focused program areas and highlights the potential risk of multiplicity and reinvention of the same tools. For example, some of the sophisticated interactive content platforms that have been developed with healthcare use cases in mind could be reused to facilitate learning, agriculture, or micro-entrepreneurship.

Mobile payments seem to be the most active horizontal innovation area, covering more than a third of the products and services that were mapped. Most of this is operator driven and focused on providing users with mobile wallets, from which they can access services like domestic and international money transfer, air-time top-up, and bill and merchant payment. A growing number of projects also use established mobile money platforms to make payments for a broader range of services. For example, in the health sector, Changamka is using mobile money to facilitate access to medical insurance by offering micropayments to Kenyans who are currently excluded from private insurance schemes because they don’t have a formal bank account.¹⁵

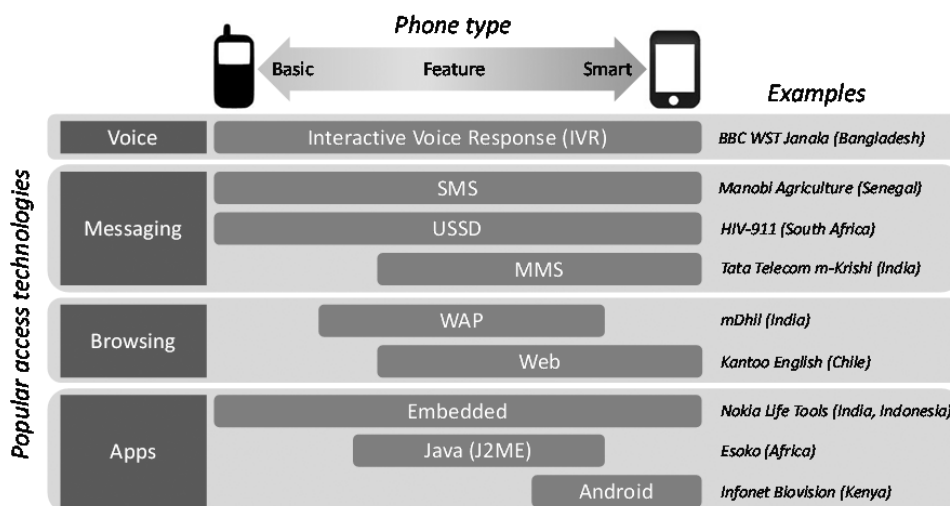


Figure 6. Access technologies used for Interactive Content service

Interactive content services have been a huge innovation area across the developing world. These services bring a key element of Internet access—automated access to previously created content—to populations without access to computers. The full spectrum of mobile access technologies have been used here (see Figure 6); for users with low-end handsets, a wide range of IVR, SMS, and USSD-based services have been developed. They can be accessed from the most basic handsets and will continue to play a key role among rural populations. There are more options for feature phone and smartphone users; an enormous range of mobile websites and apps are now available that focus on, and increasingly produced by, developing world users.

Smartphone penetration in the developing world is still low; it currently stands at around 7 percent in African markets¹⁶ and 1 percent in India.¹⁷ However, adoption is accelerating rapidly, driven by commoditization and open ecosystems, such as Android—the majority of Africans, for example, may well have a smartphone by 2017.¹⁸ The resulting increase in access to the mobile web and smartphone apps will be a huge boost for more advanced forms of interactive content and could transform lives and even cultures.

Returning to the heat map in Table 4, 40 different data-collection tools were analyzed, most of them focused on healthcare initiatives. They vary in their breadth of focus—from the very specific, such as Pesinet for child healthcare records,¹⁹ to flexible non-sector-specific software such as FrontlineSMS²⁰—and in their means of implementation—from cloud-based services such as Mobenzi Researcher,²¹ to open-source tools such as Open Data Kit.²² Another key difference lies in access technology and device compatibility; some tools are designed for large numbers of users to collect data on basic handsets (for example, via SMS),

whereas others are designed for trained fieldworkers with smartphones. However, much of the functionality required across verticals is very similar—the ability to capture data in the form of free text, multiple-choice questions, or even photos, videos, or GPS coordinates.

While some of these tools are being widely used, there are many small-scale initiatives that are not yet being leveraged across vertical sectors, geographic areas, and/or mobile operators. This gives rise to interoperability problems; tools may be designed for similar purposes (such as creating and accessing large databases of simple patient information) but use completely different data structures. Better alignment (for example, through standardization of data structures) could result in opportunities to integrate existing tools, improve functionality and ease of implementation, and achieve scale across a wider range of sectors and geographies.

In addition to global social networks like Facebook, which is used by hundreds of millions in the developing world, a number of interesting peer-to-peer platforms have also emerged that are specific to the developing world. As in the developed world, there is likely to be an increasing shift from centrally generated, interactive content toward user-generated, peer-to-peer content. These services fall into two main categories. The first category within peer-to-peer is posting platforms; at present, these are typically used for buying and selling goods (for example, Esoko,²³ an information platform primarily used for market pricing), or posting jobs (for example, Souktel Jobmatch²⁴), and have been designed for a wide range of handset types. The second category is social networks for users for whom the mainstream social networks may be out of reach; for example, social networks designed specifically for basic handsets (for example, Safaricom Semeni²⁵), and even voice-based social networks (for example, Freedom Fone²⁶) for users with low literacy levels.

However, more basic enabling technologies such as call centers and push content systems continue to play an important role, especially in rural areas where basic handsets are prevalent, and in regions where data access is limited or prohibitively expensive. For example, IFFCO Kisan Sanchar Limited (IKSL) combines a call center with IVR push content to deliver comprehensive agricultural information to Indian farmers. Push SMS messages also have unique broadcasting power and are used in a wide range of health programs, especially in HIV/AIDS prevention (educational awareness messages) and treatment (reminders to take antiretroviral drugs). Increasingly, narrowcast messaging is also being used, where each SMS is tailored to geography, user segment, or other factors.

Inventory management tools are geared toward using mobile technology to optimize supply chains for developing world consumers. A handful of these projects emerged in this sample, with pioneers such as Sproxil,²⁷ Logistimo,²⁸ and Frogtek²⁹ creating innovative services for shopkeepers, suppliers, and governments. These tools can be used to track, manage, validate, and order inventory. There will likely be a rising number and scale of inventory management services, given that many of these tools use smartphones, which will become increasingly accessible in urban areas.

There is less activity with niche devices, probably due to the higher capital investment costs associated with developing mobile hardware. However, some of the innovations in this area, such as supervised mobile payphones (for example, Psitek's Jembi phone³⁰) and airtime vending devices, have been widely adopted. At the moment, there are some particularly interesting use cases in healthcare, such as EyeNetra, a smartphone clip-on combined with an app and cloud-based platform that allows eye examinations to be conducted quickly and cost-effectively in the field.

INSIGHTS ON FINANCIAL SUSTAINABILITY

In addition to providing insights around patterns of innovation, this systematic framework can also help provide a better understanding of the potential for long-term financial sustainability and how this currently relates to different horizontals and verticals.

There is a broad spectrum of organizations working within this sphere, ranging from purely commercially driven businesses, through social enterprises and revenue-generating nonprofits, to donor- or government-funded initiatives. For the sake of simplicity, these can be categorized according to one simple question: does the organization generate any kind of revenue? This could come from end users, other businesses, advertisers, or government but excludes grant funding. This clearly does not prove financial sustainability; a detailed financial analysis of each organization would be needed to do this. This is simply a rough but useful indicator of the potential for financial sustainability.

The results are shown in Table 5 (following page), which shows the proportion of products and services that generated some kind of revenue stream across each vertical and horizontal.

In sectors where projects directly empower end users to generate or save money in the short term (for example, “Financial inclusion” and “Entrepreneurship”), a high percentage of products and services generate revenue of some kind. This is probably indicative of a relatively higher level of willingness or ability to pay. In other sectors, where services are typically publicly funded (for example, “Learning,” “Health,” and “Governance and transparency”), more products and services are purely donor or government funded—although there is increasing evidence of commercial returns within these areas and an increasing shift toward public-private partnerships with mobile operators for delivery.

For other sectors there is a more even mix of revenue-generating and non-revenue-generating projects. Overall, 69 percent of all the projects included in this research had some kind of revenue stream (or 53 percent, if excluding “Financial inclusion” as a sector).

Horizontal approaches may have some clear benefits here in terms of financial viability. Reusing the same technologies and platforms for a range of use cases can lead to better economies of scale and scope. Furthermore, horizontal approaches make it possible to serve vertical areas of need that users may be unwilling to pay

	Cross-sector	Learning	Health	Agriculture	Micro-entrepreneurship	Financial inclusion	Governance & transparency	Corporate & NGO use	Overall
Call centres	0%		57%	50%	50%				50%
Interactive content	50%	40%	55%	56%	57%	100%	0%	0%	49%
Peer-to-peer content	82%	100%	0%	83%	86%		0%	0%	72%
Push content	100%	100%	0%	33%	100%		100%	25%	33%
Data collection tools	39%		31%	0%				100%	43%
Inventory management tools			63%	100%	100%			0%	69%
Mobile payments	100%	33%	50%	100%		99%	0%	0%	94%
Niche devices	100%	100%	100%	0%	100%				92%
Total	59%	48%	47%	56%	77%	99%	17%	43%	69%
	<i>All donor funded</i>				Key	<i>All commercial</i>			
	0%				50%				100%

Table 5. Proportion of revenue-generating projects by horizontal and vertical

by charging for services in other verticals; for example, SMSOne in India is a microfranchise that charges local SMEs to advertise to the local community via SMS; the local users in turn sign up to receive a wide range of free, locally relevant news content authored by the franchisee.*

HIGH-LEVEL OBSERVATIONS

Taking a high-level, systematic view of mobile innovation across the developing world yields some interesting observations:

- Although a few narrow hotspots of innovation emerged (for example, payment systems to meet basic financial needs), the general pattern was a broad spread of activity. Moreover, there is a huge overlap in how different types of products and services are used within different sectors; similar technologies and business models often are being used to address fundamentally different human needs.
- Many initiatives that are cross-sector in nature already take a horizontal view. This may be driven by a desire to make the most of a strong technology platform across different types of users, or by a desire to meet the holistic needs of existing users through a diverse range of services delivered through a common platform. There is a risk that these kinds of initiatives may be overlooked by research or cannot be funded by existing vertically focused programs and funding structures.

The GSMA's Response: Mobile and Development Intelligence

This research laid the groundwork for a new and broader GSMA program called Mobile and Development Intelligence (MDI). Funded by Omidyar Network, MDI offers data, analysis, and user-generated content to support business decisions and to clarify the evidence of socioeconomic impact of the mobile industry in the developing world. MDI is free to use and has been designed with a broad range of stakeholders in mind.

MDI currently includes more than 100 market metrics for 140 developing countries and detailed mobile coverage maps for 180 mobile network operators. It also holds a growing database of over 1,300 relevant organizations and 600 products and services, including those profiled in this research, which will continue to be added to by the mobile community. Future tagging and categorization of organizations will allow users to analyze these products and services by sector, product, or service type and business model.

- The most successful vertical initiatives often use a number of complementary product or service types in tandem so as to reach a broader range of users and to drive a deeper level of user engagement—for example, IKSL. This approach can both broaden and deepen the social impact of these initiatives.
- Most developing world mobile projects are revenue generating. Although not explored in depth, the range of pricing models is huge—from subscription-based services, to pay-per-use, to “freemium” and advertising-funded models, as well as many B2B offerings.
- However, some sectors and types of products or services seem easier to monetize than others. Services that are most closely linked to users’ livelihoods and financial needs seem to have the highest potential for generating revenue.
- Although there is still enormous untapped potential for mobile technology to play a role across every sector, some areas are better understood and have received more financing than others. However, despite a lack of vertical program funding, there is an interesting range of emerging opportunities that has promising commercial potential and social impact around the theme of micro-entrepreneurship.

CONCLUSION: A CALL FOR SYSTEMATIC APPROACHES

While the vertical, sector-based paradigm has yielded some impressive results, our conviction is that this needs to be combined increasingly with a horizontal paradigm oriented around how different types of products, services, and platforms can be scaled to meet multiple needs. For organizations that currently work within a specific vertical, this means developing a greater awareness of how mobile technology is being used in similar ways elsewhere, or considering horizontal approaches

that use their products and services across other areas of need. A systematic perspective rather than a silo perspective is needed.

This perspective has a number of clear benefits:

- *A clear view of how existing platforms can meet new sets of user needs.* Many strong and scalable platforms exist, but their use currently may be limited to a given sector. Others who are looking at different areas of need may do better to reuse or build on these platforms, rather than starting from scratch. Although a degree of “reinventing the wheel” is natural early in product lifecycles and tends to self-correct, it often is limited by a lack of awareness of what else is out there—especially given the relatively low profile of most mobile initiatives in the developing world.

- *Sharing of knowledge and best practice.* Where existing platforms can't be reused or adapted, they can be learned from; a horizontal perspective gives innovators a wider view of what has or has not worked elsewhere. While collaborative approaches and standardization of technology can be difficult to manage, the resulting benefits and increased scalability can be extremely attractive.

- *A holistic approach to users' needs.* In reality, users in the developing world have a wide range of wants and needs. There are big advantages to using the same platforms to meet a wide range of these needs simultaneously, which will provide users with a more streamlined experience and leverage the technology learning curve they already have overcome.

- *Product and service types as a toolkit.* These can be thought of as a toolkit; many projects actually use multiple product and service types and access technologies to fulfill a specific set of linked, vertical user needs. Promoting awareness of these different product and service types could stimulate real service innovation, thereby solving problems at multiple levels via different kinds of user interaction.

Conversely, the costs of taking a purely vertical or sector-based view can be significant:

- *Increased development costs, reduced success rates, lower social impact and financial returns.* Trying to solve problems without an awareness of how these have been addressed elsewhere increases the risk of failure and leads to diminished financial and social returns on investment. It might take longer up front to research existing solutions and platforms thoroughly, but doing this will inevitably pay off later in the rollout.

- *Platform multiplicity and interoperability issues.* Having a purely vertical focus means that organizations tend to look for inspiration only at other projects in their same sector. This results in a fragmented ecosystem of small-scale initiatives—or “pilotitis.” While some common platforms are developing, our analysis of the overlaps between technology platforms reveals a strong indication of multiplicity. This may be exacerbated by tightly focused donor-driven programs. If this is the case, donor-funded organizations should consider developing more diversified funding.

- *Limited scale-up and diversification across sectors.* Reaching scale is a challenge that all businesses and international development programs grapple with, and technology is often seen as the solution to overcoming this barrier. However,

Donors and Investors

Take time to research what products, services, and platforms have already been developed, and how and where they are being used, before funding or investing in similar new initiatives.

- When funding technology solutions, consider allocating funds horizontally as well as vertically, or pooling initiatives from a number of different vertical programs.
- Encourage cross-pollination between portfolio projects where technology overlaps and synergies could exist.
- Engage in collaboration and open dialogue to create platforms and technology standards and build innovation ecosystems.
- Put a stronger emphasis on the scalability and adaptability of the technology, rather than on the depth of the social impact.
- Look for innovative new ways to use tried and tested access technologies.

Innovators (mobile operators, entrepreneurs, NGOs, etc.)

- Take time to thoroughly research existing products, services, and platforms before building anything new from scratch. Leverage other organizations' successes, learn from their failures, and avoid surprise competition later on.
- Ask whether you should be building a service tailored to a specific need, or a flexible platform for others to build on.
- Think carefully about the tradeoffs between device capabilities and reach; high-end and low-end solutions both have their place. Indicators such as literacy rates, interoperability across MNOs, and/or mobile money adoption rates may all have an impact on which access technology is most appropriate to deploy in a given market.
- Understand your target users holistically. Can a range of needs be addressed with the same product, service, or platform?
- Start with a tight focus, but consider horizontal broadening as well as geographic expansion to achieve scale.
- Seek to fund horizontal initiatives from multiple sources when funding is tightly linked to outcomes in a certain sector.

if mobile solutions are developed from a narrow, sector-specific point of view, they may miss the opportunity to reach the full scale of end users who could benefit from the same solution.

- *Increased risk of obsolescence.* Even if broad scale-up is not a priority, niche developments not supported by common platforms are harder to support over the long term and are much more likely to be left behind as handsets and access technologies and user behavior advance.

Making this shift might look very different from one organization to another. However, the recommendations above offer some specific actions for donors and

investors, and for a broad range of innovators using mobile technology in developing world markets.

While there already are many success stories, there is still untapped potential for mobile technology to achieve superior financial and social returns on investment in the developing world. There has been great excitement about the opportunity it offers to address barriers to economic progress that the international development community has struggled to overcome. It offers an ability to communicate with vulnerable populations more quickly and easily than has ever been possible, and to provide much needed commercial infrastructure.

However, to realize this potential, mobile solutions to development problems need to be created with the horizontal perspective of technology markets, not only vertically, as is the established paradigm within the development community. Mobile technology doesn't only provide unparalleled access to developing world users; it also opens up new approaches to how innovation can happen. Unlike earmarked donor funds, technology knows no geographic borders, doesn't favor one group of users over another, and thinks first about the potential to scale. Applying a systematic horizontal and vertical perspective will strengthen our understanding and ultimately unlock the benefits of mobile technology to meet the needs of more people worldwide.

ANNEX: METHODOLOGY

This research is based on a broad landscape analysis of over three hundred products and services using mobile in the developing world, undertaken by the GSMA in 2011-2012.

The focus of this sample was on new products and services, rather than reuse of existing mobile tools (for example, NGOs using existing push SMS platforms for healthcare messaging). The sample included a broad spread of "B2C" products and services, as well as many "B2B" offerings, such as mobile money platform vendors specializing in developing world deployments.

The GSMA's extensive knowledge and contact network in this sphere were used to define this sample, along with desk research of existing relevant databases and websites, donors' and investors' lists of recipients, company websites, press and social media coverage. Although there is a large and growing volume of innovation in this space, much remains below the radar of press and social media coverage. It is therefore impossible to form a truly comprehensive view of relevant organizations. However, while the sample has been increased substantially since this project was initially carried out, the overall picture and patterns have been consistent.

Each product and service was systematically characterized according to the following criteria, providing a broad range of data for analysis:

- The specific need or problem being addressed—the use case of the product or service
- The geographic area where the product/service is being used
- The nature of the key technologies used, including the access channel for

services (for example, voice, SMS, app) and type of platform and content behind this

- The nature of the organization (for example, technology start-up, social enterprise, mobile operator)
- A description of the revenue and pricing model, if any exists
- A list of project supporters, donors, and investors, if relevant

Further Reading

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1. The GSMA Mobile for Development initiative (formerly known as the GSMA Development Fund) brings together mobile operators, the wider mobile industry, and the development community to drive commercial mobile services for underserved people in developing countries.
 2. See www.mobiledevelopmentintelligence.com.
 3. See <http://www.gsma.com/developmentfund/sustainable-energy-for-all-how-mobile-operators-can-support-energy-access/>.
 4. Defined as active mobile SIMs.
 5. Mobile subscriptions per one hundred people within low-income fragile and low-income non-fragile segments in Africa were 41.6 and 49.4, respectively. Low income is defined as up to \$1,005 GNI per capita. World Bank data, 2008.
 6. Excluding Antarctica.
 7. Since its creation, the GSMA Mobile for Development initiative has partnered with 35 mobile operators in rolling out 53 services and impacting tens of millions of people across 30 countries.
 8. See <http://www.un.org/millenniumgoals/>.
 9. See <http://telenor.com/news-and-media/articles/2008/teledocors-in-pakistan/>.
 10. See <http://www.m-kilimo.com/>.
 11. See http://www.katalyst.com.bd/news/abtus_latest_news004.php.
 12. See <http://eyenetra.com/>.
 13. See <http://www.gsma.com/developmentfund/programmes/green-power-for-mobile/>.
 14. See <http://www.gsma.com/developmentfund/programmes/community-power-from-mobile/>.
 15. See <http://changamka.co.ke/>.
 16. See <http://www.reuters.com/article/2012/03/22/us-samsung-africa-idUSBRE82L0RU20120322>.
 17. See <http://www.thehindubusinessline.com/industry-and-economy/info-tech/article3017277.ece>.
 18. See <http://techcrunch.com/2012/06/09/feature-phones-are-not-the-future/>.

19. See <http://www.pesinet.org/wp/>.
20. See <http://www.frontlinesms.com/>.
21. See <http://www.mobenzi.com/researcher/>
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29. See <http://frogtek.org/>.
30. See <http://www.psitek.com/>.