Mark Surman, Corina Gardner, and David Ascher

Local Content, Smartphones and Digital Inclusion

Connecting billions of new users to the Internet will be one of the most significant events of this century. Mobile phones will be the primary way these people come online. This change is already unfolding rapidly and generating worldwide excitement, as mobile phones begin to play their part in improving social and economic outcomes around the world.

But now is the time to ask, what kind of Internet do we need to build to unlock these social and economic opportunities for people in emerging markets? Even if we solve key issues like access, affordability, and efficiency, what will the next billion Internet users find when they get online? Will it interest them? Will it improve their lives? Will they be able to help shape the Internet to ensure that it does?

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Exploring

Discovering the internet, finding information that is of interest, learning about how to navigate & interact…

Building

Contributing to the internet by creating personal profiles, comments, inputs, metadata, "UGC"

Participating

Building businesses, generating new value, selling advertising space, aggregating and representing information…

Figure 1. The 3-step path to engaging with the Internet

By the end of this year, nearly one in three people around the globe—2.3 billion—will have access to mobile broadband service, which is double the penetration of just three years ago and five times what it was in 2008, according to the International Telecommunications Union. Growth will of course be fastest in places where access has been lacking: just 20 percent of the population in the developing world has mobile broadband now, compared to 84 percent in the developed world. Within ten years, half the people on the planet will have access to the Internet through a smartphone, as hardware is commoditized and high-speed data coverage expands.

How the next wave of subscribers accesses the Internet—and what they find when they get there—will be a huge factor in determining its relevance and utility. Unfortunately, the mobile Internet we have built so far looks nothing like the wide open, come-as-you-are, read-write world of HTML and traditional online publishing platforms. In many ways the mobile Internet is "read only," not just because authoring content is difficult on small screens but because mobile content—media, apps, and services—are distributed through much more restrictive channels than the early web, or even Web 2.0.

The great promise of the World Wide Web was that anyone could publish content without a license or permission. In many ways, the bar to create and distribute new apps and services is now actually rising. The main reason for this is that a very small number of platform providers hold the keys to their respective kingdoms. Google can exert a huge influence on what apps are installed on Android through unilateral technology, policy, and business decisions. The same is true with Apple and iOS, and Microsoft and Windows phones. Without permission from a platform provider, creators can't meaningfully get their wares onto devices—or to the users of that platform. This "walled garden" approach could end up defining the entire Internet.

We worry that the next billion Internet users will have little to do but post on social networks and consume media using the apps, services, and platforms created by a few big players. What we'll then have is a world where people are simply consumers, not creators, and where the economic and social power of the Internet rests with a small number of players in a handful of countries.

But this is not just about who controls the effective "digital operating systems" of people's lives. It's also about creativity and culture. It's about artists and sellers in any city around the world being able to easily build a digital presence and a following and to share their work without ever touching a computer that they can't afford. It's about a world in which everyone everywhere can use the Internet to support the pursuit of their dreams. If we want that more inclusive world to emerge, we need to create it. It's our choice.

How do we implement this choice? It comes down to how we design the Internet platforms and services that we offer to the next three billion users. Do we make it easy for people to create their own content and services? Do we insist on open platforms for creating apps, services, and other content? If we want to design for inclusion, that's exactly what we need to do.

In this article, we argue for the creation of a diverse, inclusive, geographically distributed participation model that will allow the next billion users to directly help create the Internet that will exist in their own societies. Assuming that goal, we show that the health of the local content ecosystem is a key indicator of the inclusiveness of the Internet in practice, with clear cultural, political, and economic implications. To understand the transition needed from the mobile web of today to the mobile web that we need to build, we review the existing barriers to creating local content that exist on modern smartphone systems, and the primary models often used to shape information and communications technology activity in the developing world. Analyzing the key attributes that have made users switch from consumption to creation at scale in the past, we describe the initiatives currently under way to effect the same change for the mobile Internet.

LOCAL CONTENT CREATION: CANARY IN THE COALMINE?

Research and the history of the web suggest that user engagement with Internet content follows a three-step path: from exploring, to building, to participating.

This process will continue only if the exploring phase is engaging and relevant. Locally relevant content and services are clearly critical to that initial engagement. Facebook and WhatsApp alone will (deliberately) not show new Internet users in the developing world that they too can start to build. Without a mass of people engaged in "building" and "participating" in the Internet, little new economic value will be created, and the needs of a majority of the world population will remain underserved. This is why a lack of locally relevant content is an indicator that people aren't yet exchanging value on the Internet, and that broader digital skills development and socialization will be needed for people to benefit more fully from digital life.
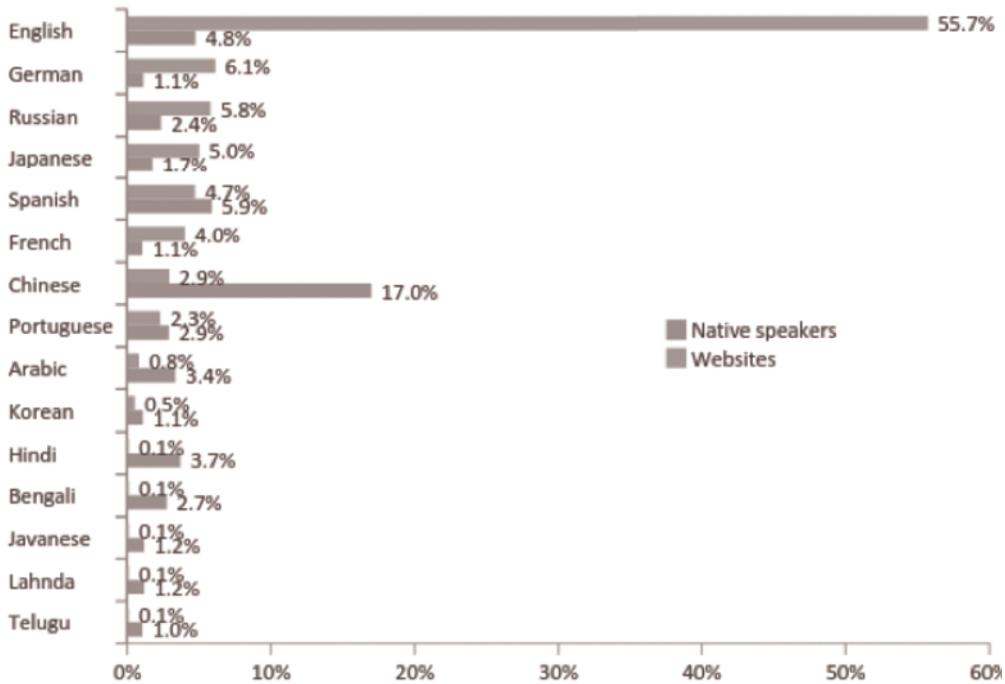
Figure 2. Native language speakers and websites in that language, globally.

For each language given, the top bar represents the global percentage of native speakers of the language; the bottom bar represents the global percentage of websites in the language.

The growth of local content and services is an important indicator that Internet users are generating value, even if the macroeconomic impact has yet to be felt. Local content is like the proverbial canary in a coal mine: where we see a healthy ecosystem, it's a good bet that people are being empowered to create, share, and build. Where local content is lacking, the conditions for digital participation are likely also lacking.

In most parts of the world today, our "content canary" is not doing well. Language dispersion is a simple useful indicator of how far we have to go. As Figure 2 shows, there is a huge chasm between the number of people speaking a given language and the amount of content available in that language. If we held up the Internet as a mirror to ourselves as a global people, the reflection would be a funhouse distortion at best: bulging in the middle, and shrunken beyond recognition everywhere else.

The top ten Internet sites in India, as measured by traffic, have just two fully Indian representatives: the *India Times* newspaper and the mobile shopping site Flipkart. The rest are Indian versions of Google properties, Facebook, Yahoo, and Wikipedia. You see similar trends across the globe, with the exception of China, which has enough critical mass to develop its own popular in-country online brands. This is due in part to the power of English as a leveling factor among edu-

cated elites who are already online, but that will change quickly as mobile broadband takes off. The question at hand is whether the new languages will grab a more representative share of the content, or non-English speakers will be further disadvantaged.

This is not a new phenomenon and several approaches are currently trying to counteract the trend, but they all have limitations:

• Development agencies are well aware that information services like health, weather, and education can support development outcomes. However, access to this information alone is not enough to sustain economic development or create the conditions for truly advanced digital economies.

• The ubiquity of mobile allows for an unprecedented level of data collection. However, there is a significant risk that the introduction of digital access in emerging markets will follow the extractive path of industries in the past. Mobile services may provide access to information, but in turn extract data for use by a minority of dominant players, often based out of country.

• The practice of "zero-rating"—increasingly common in emerging markets—further complicates this picture. Building off the success of "freemium" models in the West, zero-rating is meant to whet the user's appetite for data by providing a prescripted amount of information for free and paving the way to buy more. In Zambia, for instance, Facebook has negotiated with Airtel to provide an Internet.org app that gives users free access to a curated set of services.

Such models, however, are driven purely by the supply side. They make the user's journey from exploring to building even less likely because the incremental cost of access for non-zero-rated services keeps users inside the comfortable walls of the free services. It also makes it harder for local players to break in, innovate, and make money in a world where network effects already favor the platform first movers.

When it comes to mobile content, the skew toward non-local content is worse, for ergonomic, economic, and policy reasons. In developing countries, where the more expensive full-size computers with keyboards are less ubiquitous, the technology used to create apps is relatively less accessible. Original content creation on touch devices is still in its infancy, as the specific form factor of much mobile content (apps in particular) implies a relatively expensive development process. Finally, the global nature of the Internet, combined with the high investment cost for new content and services, is a strong incentive for even small teams far from Silicon Valley to target global audiences rather than local audiences. Angry Birds may have been built in Finland, but it (rationally) targeted (and reached) a global audience.

MOBILE FOR DEVELOPMENT (M4D)

Specific efforts have been made to bolster local mobile content in the emerging economies. These initiatives often fall under the banner of "Mobile for Development" (M4D) and are characterized as commercial (focused on growing
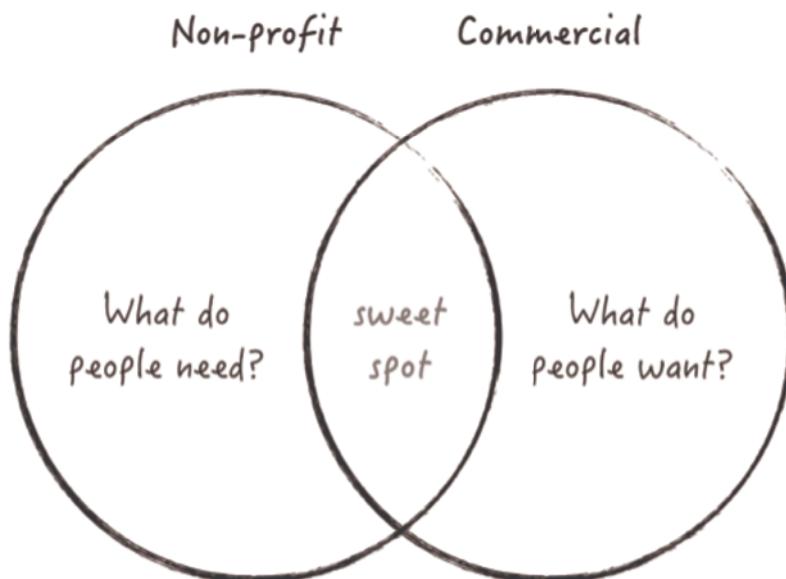
Figure 3. Mobile for development (M4D) "sweet spot"

commerce) or nonprofit (motivated by a social outcome). The overlap of these two is considered the M4D "sweet spot"—the services specifically focused on the lower-income customer segment that can also fuel thriving enterprises (see Figure 3).

Fortunately, access to these populations through mobile networks is increasing our understanding, and pilot projects are helping us to develop better approaches to providing these customers with truly valuable services. In order to have a long-term impact, M4D investment is aimed at understanding what an individual with relatively limited resources is willing to pay for, and then to build those services in ways that make them self-sustaining over time.

Services developed in the M4D space take into account a number of basic assumptions about customers: they only have access to basic feature phones rather than data-consuming smartphones; they have low levels of literacy; and they have limited disposable income to spend on mobile services.

In seeking the M4D sweet spot, mobile carriers have deployed a mix of short-messaging service (SMS) and interactive voice response (IVR) messages to mobile phones throughout sub-Saharan Africa and South Asia. Content might include the latest advice on how to feed your baby, fertilize your crops, and correctly pronounce English words—provided along with paid subscriptions to cricket score updates and the latest ringtones.

While we have found some successful overlap of commercial interests and social benefits, there are very few examples that have reached a large scale. If we
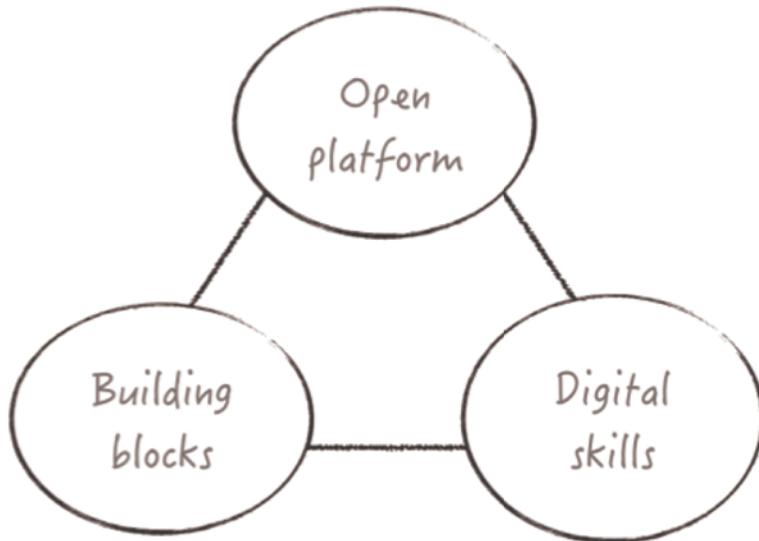
Figure 4. Factors in web content creation

want to have the impact that is needed, this approach will not be sufficient. In many cases, such services represent a big leap forward for farmers and others who have never before had access to this kind of information, but it remains only the consumption part of the story. Vibrant digital economies also require production information. If we can't get healthy participation on both sides, we are likely to slide toward digital exclusion.

As we have moved rapidly into an era of more affordable and widely available smartphones, much of the conversation in the M4D community has been about how to provide similar information on new platforms. While the need for health, educational, and other traditional M4D services will definitely be needed in the smartphone platform era, we should be focusing on how to shape those platforms to host an organic proliferation of locally produced content that has the potential to support and bolster real livelihoods.

A TOOLKIT FOR VIBRANT CONTENT CREATION

An obvious question at this stage is: What platform characteristics will specifically support the creation of vibrant local content among people now coming online via smartphones? The best period to study to determine this is the first wave of Internet content creation, in the era of the desktop web. As the web took shape in North America and Europe in the 1990s, three key factors fueled the growth of content and services from a wide range of small and localized players:

- **Building blocks.** It was easy to create content and services (with open standards such as HTML and easy tools such as Microsoft FrontPage).
- **Skills.** People understood and seized opportunities on the Internet (such as creating a web page) and quickly developed the necessary skills, both hard (markup, setting up a website, etc.) and soft (understanding links, how to make money with SEO, etc.).
- **Open platform.** There was easy access to markets and few real web gatekeepers.

In the 1990s and early 2000s, small businesses rushed to create their own web presence by building individual sites. Internet service providers welcomed new customers with low-cost offerings. Brand new web-based business models quickly emerged as well, including various forms of advertising and online commerce. Capital was made available to enterprises with the potential to scale. The result in the decade or so since has been a hugely prosperous digital economy that has made so many aspects of our lives easier, while also creating wealth and opportunity for people able to grasp the potential of digital tools.

> The combination of easy-to-learn HTML and view source enabled millions of people to easily figure out how to become creators on the web.

Without the right building blocks, easy-to-learn skills, and an open network, it's unlikely that any of this would have happened. Yet, as we move into what seems like a huge moment of opportunity—the expansion of the Internet to the rest of humanity—the fundamental qualities of the early Internet clearly have eroded.

The building blocks of creativity—the ability to learn how to make digital content on an open, permission-free network—are in decline as we move to a mobile web dominated by apps and app stores controlled by the few large companies behind mobile operating systems. The coming digital world needs an approach more like the original web than the current mobile ecosystems, one that provides the kind of democratic access and opportunity that drove past successes. To design and invest in a world that is open to creativity, innovation, and opportunity at the most local level, one must start by looking at the essential building blocks.

In the desktop era, the answer was HTML, or hypertext markup language. If you could use a word processor such as WordPerfect to "reveal codes," you could teach yourself how to make a rudimentary web page. Then along came Microsoft FrontPage, which made it possible to use Microsoft Word to build a web page, while the "view source" browser function allowed anyone to see how a web page they liked had been created. The combination of easy-to-learn HTML and view source enabled millions of people to easily figure out how to become creators on the web.

From there we moved on to early cloud publishing platforms, such as Blogger, WordPress, and Movable Type. These kinds of products allowed everyone, from artists to small businesses to budding web services, to get online quickly by using building blocks. These types of building blocks have not yet been created for mobile operating systems on any meaningful scale. Successful social media platforms such as Facebook and Instagram are the introductory point for many who want to create and share content online, and these are good first steps. But the "app"—the most familiar unit of content in the mobile world—is a very difficult medium for creators to approach. Creating apps requires specific skills, specific packaging, and specific preparation, and they must be approved by the platform gatekeepers. Mobile apps don't have the same transparency as web pages, thus the ability for anyone to learn their mechanics (and to succeed through imitation) is not built into the system.

Existing mobile networks also have constraints: Unstructured Supplementary Service Data (USSD) requires the cooperation and permission of mobile carriers; it's hard to imagine new USSD services emerging from the proverbial garage operation, which was a critical phenomenon in the desktop web era. As a result, we have an exclusive ecosystem oriented toward professional developers at the expense of a broader set of content creators.

The necessary next step is to build software and an operating system that make it easy to create any content—personal apps, a web page, a video—that posts directly to the Internet and doesn't require membership in a social network or approval from a gatekeeper. Moreover, application programming interfaces (APIs) and widgets are needed to easily pull in interoperable functionality, such as mobile money, customer relationship management, and weather data and maps, that tie to locally relevant back-end services, especially those that can contribute to the economic success of all parties in the local value exchanges. With these things in place, we will at least have the necessary fuel for independent content and services in emerging digital marketplaces.

PUTTING THEORY INTO ACTION

What we've outlined above is a theory: if we can replicate the conditions that existed for early desktop Internet users, then we are likely to unlock more opportunity for the next three billion people who will come online through mobile. The starting assumption for this theory is that the global transition from feature phones to smartphones will be complete within the decade. Mozilla is participating in this transition with Firefox OS by bringing ultra-low-cost devices to market, such as the $33 phone that just launched in India.

Over the past year, Mozilla, GSMA, and a number of mobile industry partners have been talking about ways to test this theory. We also are working on a number of initiatives to build the core components of a user-driven mobile Internet to test these components and deploy them with mobile operators around the world.
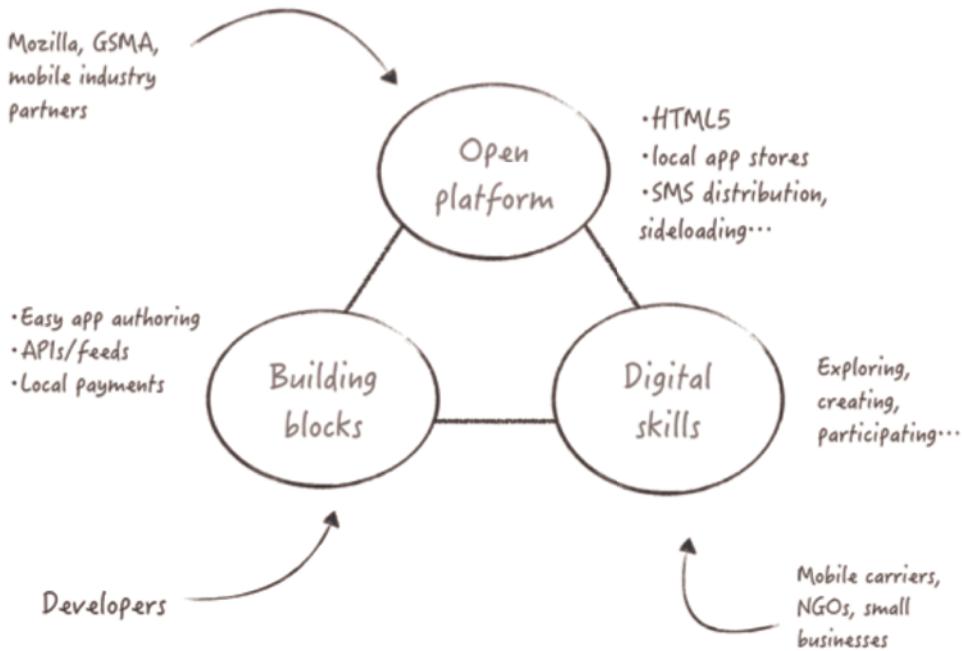
Figure 5. Fleshing out the pillars of an open mobile Internet

The first step in this effort has been to work on the building blocks—that is, to create software and an operating system that replicates the ease of use and access to source code that existed on the early Internet. We want to make it easy for smartphone users to become creators of mobile content and services.

One important part of this experiment was to create an authoring software system ("Webmaker") that makes it as easy to create a useful mobile application (using a mobile phone!) as it was to create a website in FrontPage, while taking into consideration the literacy levels of the potential creators. Another part is to work with carriers and other partners to create maker-friendly APIs that can integrate services such as mobile money, advertising, weather information, and the like into a simple app. By creating easy application authoring and useful APIs, we believe we can create the foundations for local content and, by extension, a participatory mobile Internet. We don't believe, expect, or even hope that our system will be the only one that works. We do hope that it will show what's possible.

The next step in this effort is to develop ways to massively improve the digital literacy of people coming online for the first time. By actively moving people through the stages of exploring, building, and participating, we intend to turn mobile users into engaged, empowered Internet citizens who are able to both find and create value on the Internet.

The desktop web grew slowly relative to today's mobile growth, and the necessary skills were defined after the fact. We need to take a much more intentional

Figure 6. Web literacy framework

Source: https://webmaker.org/resources

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approach to making sure that the next three billion users have a way to learn the skills they need to benefit from the Internet. As a start, Mozilla has developed a framework that describes the skills and competencies people need to be considered "web literate."

This starts with understanding the mobile Internet and what it can do, then leads seamlessly to creating content and successfully running a business—and a life—online. These are not skills that only programmers need; they are skills that everyone needs to take part in a digital life and create local digital economies. We need to find a way to get these skills to everyone, including shopkeepers, farmers, and all kinds of creators from every part of the world.

To make this happen we are working on practical ways to make mobile content and the app economy into something as open as the web. Part of the process involves encouraging people to make apps and content using web technologies such as HTML5, which makes it possible for content and services to run on any smartphone without going through an app store first. From there we will need to find ways to popularize the distribution of apps and services that are more open than current app stores. We're going to experiment, for instance, with sideloading, SMS distribution, email distribution, and hyperlocal or carrier-run content discovery systems (aggregators, stores, search engines, etc.). All of these things have the potential to create open distribution patterns that are more like the open environment of the desktop web and to provide room for many to build growing businesses.

ENGAGING CONTENT FOR NEW WEB EXPLORERS

In emerging markets, the smartphone penetration rate stands at about 10 percent, which means that now is the time to create the foundational content that will

enable a fruitful exploration phase for newcomers. We have time, but there is also some urgency, because if people's first contact with the Internet offers little value beyond unaffordable consumption, we risk a massive retreat—by users, funders, companies, and governments—from the inherent opportunities. We are prepared to use this window of time to build content that demonstrates value as access increases.

To do so, we need coordinated efforts at the market level to create measurable impact. We envision a partnership that brings together the mobile industry, academia, government, the international development community, innovators, and digital entrepreneurs to create a serious, multidimensional campaign with a single goal: to rapidly increase the amount of locally relevant content created in any given country in a short period of time.

By prioritizing this common goal, we believe that the relevance and value of the Internet to any country's population could be dramatically increased in a short period, without a herculean effort. Mobile network operators could make the software and platform tools known and available through handsets in the market. Technical universities could offer training for their students and host outreach programs to create understanding and the ability to use these tools. Given useful and accessible systems, users will, we predict, do their part.

We believe that the critical challenge that comes with the onboarding of the next billion mobile users is to provide an Internet that works for them—not one that simply sells them media and services. With these foundational elements in place, we believe the Internet that the next billion users encounter will both reflect their needs and offer them deep and lasting value. To see this happen, all parties—operators, governments, NGOs, and techies—have a role to play.

Emrys Schoemaker

The Mobile Web: Amplifying, But Not Creating, Changemakers

Technology companies and development experts describe the mobile Internet as the technology that will transform the lives of the world's poor. Describing Internet connectivity as "the foundation of the knowledge economy" and a human right, Mark Zuckerberg, founder of Facebook, launched a philanthropic initiative, Internet.org, to provide free access to Facebook and other select Internet sites. Google is experimenting similarly with balloons and broadcast frequencies—such as "white space" from the unused television spectrum—to drive access, and it also has launched Google Zero in partnership with mobile network operators to provide free access to select Google services. The Wikipedia Foundation also has joined the movement, partnering with 29 operators in 34 countries to provide mobile users access to Wikipedia Zero, with the goal of building "a world in which every single human on the planet has equal access to the sum of all knowledge."

Development organizations also have embraced technology's potential to reduce poverty; the World Bank argues that smart phones with data connectivity "not only empower individuals but have important cascade effects stimulating growth, entrepreneurship, and productivity throughout the economy as a whole."[1] Both private-sector and development organizations thus share a common belief that access is the key to unlocking technology's full potential to contribute to economic growth.

However, because technology tends to amplify existing patterns and intent, focusing solely on access is likely to entrench existing inequalities further. To counter any amplification of the culture of poverty and oppression, people in the developing world will need to have the capacity to produce digital content that can enhance local knowledge and strengthen champions of change.

This essay first outlines the economic argument that dominates the case for using the mobile phone in development, and then shows that technological con-

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straints favor using mobile phones for entertainment over productive use. It also discusses the impact information technology has on culture in order to provide a novel understanding of the impact the mobile Internet has on development. It concludes with some thoughts on applying this concept to possible strategies and interventions.

ICT AND DEVELOPMENT: ECONOMIC GROWTH AND INFORMATION

The arguments in favor of using the mobile phone as a development tool draw their theoretical power from seminal studies now viewed as canonical references. In the field of economics, Robert Jensen's description of how fisherman in Kerala, India, used mobile phones to reduce variation in sardine prices has become an enduring point of reference.[2] He found that the mobile phone introduced market efficiencies that increased fishermen's profits by an average 8 percent and reduced the cost of fish by an average 4 percent. Another much-cited study, by Waverman et al., correlates an extra 10 mobile phones per 100 people with a 0.59 percent increase in GDP of (all other factors being equal).[3]

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One of the earliest studies of the mobile phone's role in political processes was Vincente L. Rafael's examination of the 2001 uprising against Philippine president Joseph Estrada. Rafael presented an optimistic view of the mobile phone, noting that "at its most utopian, the fetish of communication suggested the possibility of dissolving, however provisionally, existing class divisions."[4] More recently, writers such as Clay Shirky have described the uprisings across the Middle East as "mobile- and Internet-powered political transformations."[5]

There also is a rich vein of work on the mobile phone's contribution to cultural change, described as a "mind and society altering technology" that contributes to changes in the way people interact and organize the most intimate aspects of their daily lives. A growing number of anthropological and sociological studies

state that the perpetual contact and universal addressability of mobile phones have significant implications for social relationships and interactions. Rich Ling, one of the earliest sociologists of the mobile phone, describes a "bounded solidarity" and argues that "the mobile phone tips the balance in the favor of the intimate sphere of friends and family."[6]

However, the function and effects of the mobile phone as a media device are the most significant aspects of the technology in terms of social change. Tomi Ahonen, a mobile industry analyst, terms the technology "the seventh mass media," and it is increasingly apparent that mobile media are characterized by social networking and the consumption of entertainment content.[7] There is a wealth of studies that describe mass media and entertainment as contributing to the globalization of Western values such as autonomy and individualism, from contributing to the overthrow of communism to introducing the concepts of rationalism and positivism.[8] Recent studies have examined how television affects social values in developing countries; Robert Jensen and Emily Oster's study, for example, finds a correlation between access to cable television and marked increases in women's autonomy, which decreases the acceptability of wife-beating as well as preference for sons. The effects of access to cable television, they argue, are on a par with the effects five years of education or moving to an urban environment can have.

Despite the significance of these findings on the social and cultural impact of electronic media, the international development community's interest in the roles of mobile phones and the Internet is dominated by their potential for economic growth. This paper argues that, because mobile Internet usage is dominated by entertainment consumption, the impact of the technology is best understood in terms of its implications for cultural attitudes and values. As a lens through which to approach development, culture is the subject of increasing attention. Individual values and attitudes provide a way of understanding the choices people make. Culture therefore provides a rich diagnostic of development challenges and future development interventions, a stance that is gaining attention from mainstream development actors such as the World Bank.

THE ENTERTAINMENT VALUE OF THE MOBILE INTERNET

The technological characteristics of mobile phones mean that mobile Internet use is characterized more by entertainment consumption than economic productivity. The argument that new mobile technologies can help bridge digital divides and "leapfrog" the stage of fixed-line Internet access is challenged by critics such as Philip Napoli and Jonathon Obar. They say it fails to account for the fact that accessing the Internet on a mobile phone is very different than doing so on a desktop computer.[9] The limited memory, speed, and storage capacity of mobile phones constrains productive business use and news consumption.[10] These limitations also affect content creation; studies have found that mobile users write fewer and shorter e-mails and participate less in chatrooms than desktop computer users.

The mobile web is also different from the fixed-line web. One estimate suggests that less than 10 percent of the web is mobile-ready—that is, reformatted for the small screens of smartphones and even smaller screens of the feature phones that dominate use in developing countries.[11] Moreover, sites that do have mobile versions often contain less information, as content is stripped down for ease of use. For example, mobile search engine designers say users are usually "messing around" rather than seeking specific information. A further distinction exists between the open Internet of browsers and the Internet of applications such as Facebook and Wikipedia. The latter create a walled-garden type of experience that is a "much less open and much more constricted model of Internet access than traditional Internet access."

Contrasting with claims of the mobile phone's productivity value, Napoli and Obar argue that mobile information consumption "tends to be weighted much more heavily toward entertainment and leisure than is the case with PC usage."[12] A study of mobile Internet usage patterns by Opera, which develops mobile phone browsers, found that usage is dominated by searches and social networking, followed by e-mail and entertainment. This finding is not restricted to mature markets or wealthy users. For example, Nimmi Rangaswamy and Edward Cutrell show how resource-constrained Indian slum dwellers use early Java-enabled phones to seek out free sites to download games, songs, and pictures of popular Bollywood stars. They find that "the use of the mobile Internet completely comprises Audio Visual downloads, gaming and chatting," and that young users are "happy to divert time and money that might be spent on 'developmental' usages to mobile video downloads."[13]

If mobile Internet use in emerging markets is characterized by the consumption of entertainment content, then Facebook and others who claim that Internet access alone drives development will have to explain how entertainment content contributes to the promise of economic and social progress. There certainly are examples of entertainment contributing to changes in peoples' attitudes, at least in a cultural context.

CULTURE AND DEVELOPMENT

There is growing awareness among people working in development that culture may actually have an important role to play in trajectories of change. This emerging understanding of the role culture plays in the decisions people make points to a framework that can aid in understanding how mobile Internet might amplify existing social norms, and the role it is likely to play in development.

Early modernization theorists recognized the significance of culture in development, but they saw traditional values as a barrier to modern norms and values—a barrier that media could help overcome. Daniel Lerner, for example, described how information technologies such as television and communications media could inject "a spirit of rationalism and positivism" that would disrupt traditional "backward" cultures.[14] While modernization theory has been largely rejected for

assuming that Western values and lifestyles are superior and the only true form of modernity, the idea that culture is significant is again the subject of attention within development circles.

The idea that understanding culture is important in understanding human decisionmaking is gaining traction within development thinking, as there is increasing evidence against the idea that human beings are uniformly rational and self-interested and will maximize utility. These principles of economic and development policymaking are attracting critical attention from both policymakers and academics. For example, the World Bank's "2015 World Development Report," the organization's most significant annual publication, examines mind and culture in response to the increasing evidence that people draw from culturally available heuristics when making decisions, rather than from a universal rationalism.[15] (See, for example, the work of Kahneman and of Henrich et al.[16])

Cultural anthropologists have also developed the idea that the culture is a factor in shaping action. Swidler's influential 1986 paper argued that "culture influences action not by providing the ultimate values toward which action is oriented, but by shaping a repertoire or 'tool kit' of habits, skills, and styles from which people construct 'strategies of action.'"[17]

Embracing the idea of culture as a resource that provides meaning and strategies for action means discarding the idea that technology can inject ideas from the outside and disrupt traditional culture and creating a new theoretical framework for thinking about the relationship between technology and culture.

TECHNOLOGY AND AMPLIFICATION

The concept of technology as an amplifier of human intent and capability, rather than as a source of new ideas and a disruptor of existing social norms, offers a different way of thinking about the impact of information technology on culture and development.

Although the idea of technology as an amplifier of human intent is so commonsense that it's a National Rifle Association motto—"It's not guns who kill people, people do"—it has received limited attention from scholars of information technology and development, although studies in areas that inform development theory do examine amplificatory trends. For example, some studies examine the effects cable television and social media have on political and social attitudes, finding that the design of technologies and the choices people make can amplify existing values.

One of the few people to make the link between information technology, amplification, and development is Kentaro Toyama, a computer scientist who formerly worked with Microsoft Research in India. Toyama argues that "the amplification thesis contradicts theories that imply that technology's impact is additive or transformative in and of itself, e.g., that access to technology levels the playing field of power, or that the Internet, per se, democratizes access to information."[18]

To make his argument, Toyama builds on work by a number of scholars outside the study of information technology in international development.[19]

Toyama starts by describing the work of Philip Agre, who writes about the Internet in political processes and argues that "the Internet changes nothing on its own, but it can amplify existing forces, and those amplified forces might change something."[20] Toyama also summarizes the work of Warschauer, who examines technology in education systems:

> We found no evidence to suggest that technology is serving to overcome or minimize educational inequities . . . Technology does not exist outside of a social structure, exerting an independent force on it . . . Rather . . . the introduction of information and communication technologies . . . serves to amplify existing forms of inequality.[21]

Tichenor et al's studies of mass media find similarly that those with higher socioeconomic status absorb most information, leading to what he terms a "knowledge gap hypothesis" in which public service information benefits those with more education and thus widens the knowledge divide.[22]

Toyama concludes that, unlike disruptive theories of technology, which argue that equal access will lead to an outcome of greater equality, "technology is merely a magnifier of underlying human and institutional intent and capacity, which can themselves be positive or negative."

AMPLIFICATION AND ATTITUDES

How might this principle of amplification affect the mobile Internet's impact on cultural meaning and values? While this has received limited attention in the context of development, a number of studies have found a relationship between media consumption and the amplification of political and social attitudes.

Driven by the economics of user attention, social media sites selectively filter stories, posts, and information to maximize user attention—a process that provides content that confirms what people already believe. Pariser popularized the concept of the "filter bubble" to describe how the design of algorithms and recommendation engines that underpin social media sites are oriented toward providing content that people enjoy consuming, which tends to affirm their existing attitudes.[23] Indeed, Facebook recently carried out a controversial study to determine how to influence users' emotions most effectively. The study found that people's emotions were amplified by the content they consumed, a phenomenon known as emotional contagion.

Research also shows that, when likeminded people discuss an issue, they tend to end up with a more extreme opinion. Studies of cable television and social media consumption show that people select ideologically congruent news channels, and that social media users tend to inhabit an "echo chamber" that amplifies their existing opinions and group attitudes.[24] Some argue that this leads to a more polarized public.[25] These effects are so great, and so grave, Sunstein argues, that the

implications directly challenge the kind of debate central to deliberative and participatory politics, and that the Internet might be inherently incompatible with democracy itself.[26]

The Pew Research Center's recent study on public discussion of the Edward Snowden case, in which he leaked details of the U.S. National Security Agency's (NSA) public surveillance program, highlights how social media might limit diverse debate. The study finds that, "if people thought their friends and followers in social media disagreed with them, they were less likely to say they would state their views on the Snowden-NSA story."[27] The study also warns that this "spiral of silence" might spread offline, as it has found that the average Facebook user is "half as likely to talk about Snowden-NSA issues at a physical public meeting than a non-Facebook user."[28] This could have implications for public debate and diversity of opinion in public life.

A measurable effect of filter bubbles, echo chambers, and spirals of silence is the amplification of existing beliefs, attitudes, and values and the dampening down of debate. There is, of course, no reason to assume that these findings will not also apply in developing countries, which will amplify existing attitudes and behaviors that perpetuate and reinforce the kind of inequality that inhibits development.

This is precisely what may happen if the focus is only on increasing mobile Internet access. Toyama argues that, "short of dramatic co-investments in building human and institutional intent and capacity, mobile phones will only amplify existing forces, and continue to privilege richer and more powerful individuals, communities, and nations."[29] Focusing on access to technology without attending to the capability and motivation to use it will not address the foundations of global poverty.

AMPLIFICATION: STRATEGIES FOR DIGITAL DEVELOPMENT

What kind of strategies and interventions might support the use of mobile data to amplify particular development goals and strengthen certain cultural resources over others?

Rejecting the idea that there is a singular form of progress necessarily means accepting that there are multiple forms of development and modernity, which emphasizes the importance of recognizing that change is not driven by external experts or technologies but by "local knowledge and decision-making power."[30] This view demands a shift away from large-scale, top-down technology and knowledge transfer programs and toward in-depth investigations of people's contexts and everyday realities to understand what Amartya Sen believes are the kinds of lives people value.[31]

The goal of development assistance organizations must therefore be to seek the people, groups, and organizations that are already working to make a difference in people's lives, rather than defining their own aspirations.[32] In other words, the focus must move from an externally driven, technologically dependent disrup-

tion of poverty and inequality, and must strengthen existing change agents' ability to use technology to amplify their efforts. In Toyama's words, technology "is best employed as support and amplifier."[33] An existing body of theory and work already employs this approach. . Communication theorists Srinivas Melkote and H. L. Steeves distinguish a communications for development approach from four other common approaches to using communications for development: the Communication Effects Approach, the Mass Media and Modernization Approach, the Diffusion of Innovations Approach, and the Social Marketing Approach.[34] These four are characterized by a top-down approach to communication in which experts share specific information with the "information poor " to bring about specific changes the former have identified as being for the benefit of the latter. Melkote and Steeves argue instead for a communications approach characterized by engaging the poor and empowering them to achieve the kinds of changes they themselves value.[35] The individualized and networked nature of mobile Internet, even more than the mass media referred to by Melkote and Steeves, offers opportunities for people to participate and strengthen their ability to achieve change.

INTERVENTIONS FOR DIGITAL DEVELOPMENT

The communication for development approach is not just theory. It has a demonstrated track record of successful interventions, which efforts to use the mobile Internet for development could learn from.

Practitioners of communication for development embrace the power of entertainment to engage and educate audiences. While most "edutainment" programs target individuals, communication for development engages with individuals' wider social contexts to strengthen existing change agents. For example, the television health program *Soul City* reaches 80 percent of South Africans and has had a measurable impact on a wide variety of sexual behavior and gender relations, such as a 3 percent reduction in intergenerational sex among respondents exposed to the program. In Rwanda, radio dramas designed to reduce prejudice and promote tolerance have had a measurable effect on people's ability to accept those who think differently.[36] Evaluations emphasized the importance of community-based radio listener groups that create opportunities for communities to discuss strategies for change.

What then might mobile data-oriented interventions look like? One example that demonstrates the successful use of digital technologies for change is Apps for Good, which was founded in 1995 as part of a technology program to empower young people in Brazilian favelas. The program emphasizes skills in creating technology and critical problem-solving skills. Apps for Good participants learn how to solve social problems with technologies such as Stop and Search, an app that allows young people to rate their experience of being stopped and searched by the police. Apps for Good has since expanded to the UK, and in 2014 more than 20,000 young people entered Apps for Good training programs. Other organiza-

tions in the developed world also are building change agents' ability to use digital technologies: Witness, a human rights organization founded by Peter Gabriel, provides video and technology training to human rights activists to help strengthen their work. Tactical Tech, a Berlin-based capacity-building organization, targets active change agents and empowers them to use information and communications in ongoing projects and tailored technology-training programs.

The common lesson from these and similar efforts is that success depends on building alliances and strengthening the capacity of those already working for change. Where tools are provided but no training is given, the tools often lie unused. Applying the lessons of development communication will mean focusing on building skills and solving specific problems while emphasizing engagement with the wider community and social norms. Technology alone is merely an amplifier.

In today's networked world, the potential to forge alliances that are wide and deep is immense, but we must leave behind approaches that focus only on access and recognize that they tend to amplify the status quo, rather than to disrupt inequality and power. Technology alone cannot disrupt poverty or promote equitable change—indeed, left to market forces, it is likely to do the opposite. The mobile Internet can be harnessed most effectively by those who have that capacity and are already on the upper slopes of the socioeconomic pyramid. We need to invest in building the capacity of those at the base of the pyramid and seek out change agents who are already working to alleviate poverty and inequality.

Building the digital economies of tomorrow depends on building the digital capacities of the change agents of today.

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