



# Mobile For Development Impact

Approaches to local content creation:  
Realising the smartphone opportunity



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## Mobile for Development Impact

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# mozilla

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**Read the [Mozilla Manifesto](#) to learn even more about the values and principles that guide our work.**

# Approaches to local content creation: realising the smartphone opportunity

## Executive Summary

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Mobile connectivity is enabling large parts of the world to come online for the first time. **However, the creation and distribution of digital content remains deeply uneven. While nearly half of the world's population are now online (43%)<sup>1</sup>, entire languages, cultures and regions are absent or underrepresented.** This limits growth and poses challenges for a number of different actors. For mobile operators this is a market development consideration as they are counting on mobile data consumption to replace declining voice and SMS revenue. If users don't find an internet that is relevant to them, they will have little incentive to pay for it.

At the same time, the increase in access to smartphones means that it's cheaper and easier than ever for locally relevant information to be created and disseminated. **Digital content need not only be created in an expensive, remote, and top-down way by providers on the supply side; users themselves can be a source of considerable innovation.**<sup>2</sup> The role and benefits of phenomena like user-generated content (e.g. platforms like Facebook) in this process have already been demonstrated. With growing smartphone ownership, it is possible to envision new patterns of content creation—and ways in which users themselves can take part in shaping the mobile internet in emerging markets.

**However, if this opportunity is to be realised, there will need to be large improvements in users' digital skills across emerging markets.** The more users understand the digital world, the more likely they are to become engaged in creating content. Moreover, user education efforts need to evolve from being product and service-specific, toward broader notions of digital literacy.

There will also need to be investment in products and services that enable mobile content creation. In this report, we share lessons from the design and development of Mozilla Webmaker, a free and open source tool intended to make mobile content creation accessible to anyone with an entry-level smartphone. Initial pilots of Webmaker have demonstrated that there is a strong appetite for such tools among mobile users in developing countries, and significant potential to increase content creation with local communities across Africa, Asia, and the Americas.

**Within this report, three principal questions are considered:**

1. What is the baseline of digital literacy that is required for users to embrace the mobile internet, and to begin the journey toward becoming a “content creator”? (see [chapter 2.1](#))
2. What kinds of tools and user education programs could radically lower the barriers to content creation? (see [chapter 2](#) and [chapter 3](#))
3. Could investments in these kinds of training and tools have positive impact on the digital ecosystem in ‘mobile-first’ countries<sup>3</sup>? (see [chapter 3](#))

**Higher skill levels and a larger amount of relevant content would benefit a range of actors, including the mobile industry, government and civil society.** If the right investments are made, many more newcomers to the internet will enjoy the benefits of online life, and will be able to create value for themselves and others in the process.

<sup>1</sup> ITU

<sup>2</sup> Eric von Hippel, *Innovation by User Communities: Learning from Open-Source Software*, MIT Sloan Management Review 42, no. 4 (Summer 2001)

<sup>3</sup> A ‘mobile first’ country is one in which the majority of users use mobile devices (rather than PCs or laptops or other devices) in order to access the internet

# Introduction

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In 2014, the GSMA and Mozilla formed a partnership in order to explore approaches to stimulating local content creation in new smartphone markets. This partnership was based on the insight that the falling cost of smartphones would allow most people on the planet have access to a powerful, general purpose computer. By the end of 2020, there will be 3 billion people using the mobile internet in the developing world, the majority of whom will be using smartphones.<sup>4</sup>

The global transition to low-cost, internet-capable smartphones presents an enormous opportunity for market development, socio-economic progress and for reshaping the consumer internet experience. While many feature phones are internet-enabled, they have limited, inflexible operating systems with feature sets that are fixed over the lifetime of the device. In contrast, smartphones can adapt and grow in capability over time, through over-the-air updates, the installation of new applications, and user customisation. Crucially, they also enable users to create their own content with far greater ease. Our intention for this report is to increase understanding among those working in the mobile industry as to what may be possible in this area.

To enable this new approach to local content creation, large scale efforts to increase the digital literacy of new smartphone users will be crucial. By assisting mobile users to move through the stages of reading, writing, and participating in the mobile internet, it will be possible to increase the number of people who can both find and create value on the internet. As a result, this a timely issue for both mobile operators and device manufacturers as well as governments, international development donors and NGOs.

This report examines the role **low-cost smartphones, digital skills, and content creation** can play in creating a more locally relevant web. Growing ownership of smartphones in emerging markets opens the possibility for ‘demand-side’ creation, where users themselves fill the local content gap.

Among the innovations described in this report is [Webmaker](#), a free and open source content creation platform for low-cost Android phones. This report contains lessons from the design process and results of a limited beta release in Bangladesh, Cambodia, India, Kenya, and Rwanda, suggesting ways in which specialised tools could lower the barriers to entry for content creators.

We also examine how digital skills can increase engagement with the mobile internet, and enable users’ progress on the journey toward becoming a content producer. We describe various approaches to investing in user capabilities, including the results of a small scale randomised control trial evaluating the effect of digital skills training on mobile internet engagement (and users’ data consumption).

Finally, we explore approaches to multi-sector partnerships for increasing awareness and local content creation, and whether there is a role for operators to invest in this transition.

## **This report incorporates findings from several research methods, including:**

- I. 12 weeks of ethnographic field research between August 2014 and July 2015. This field research provides a snapshot in time of smartphone owners’ attitudes toward the mobile internet, as well as their motivations and constraints regarding mobile content creation.
- II. A year of user-centred design, software prototypes, iteration, user testing and experimentation, to test several theories of how to activate users to become creators and ambassadors of the mobile internet.
- III. Two pilot studies testing the impact digital skills training and content creation tools have on new smartphone users.
- IV. Desk-based analysis.

<sup>4</sup> Developing world refers to countries [defined by the World Bank as low- and middle-income economies](#). GSMA country classifications follow this methodology



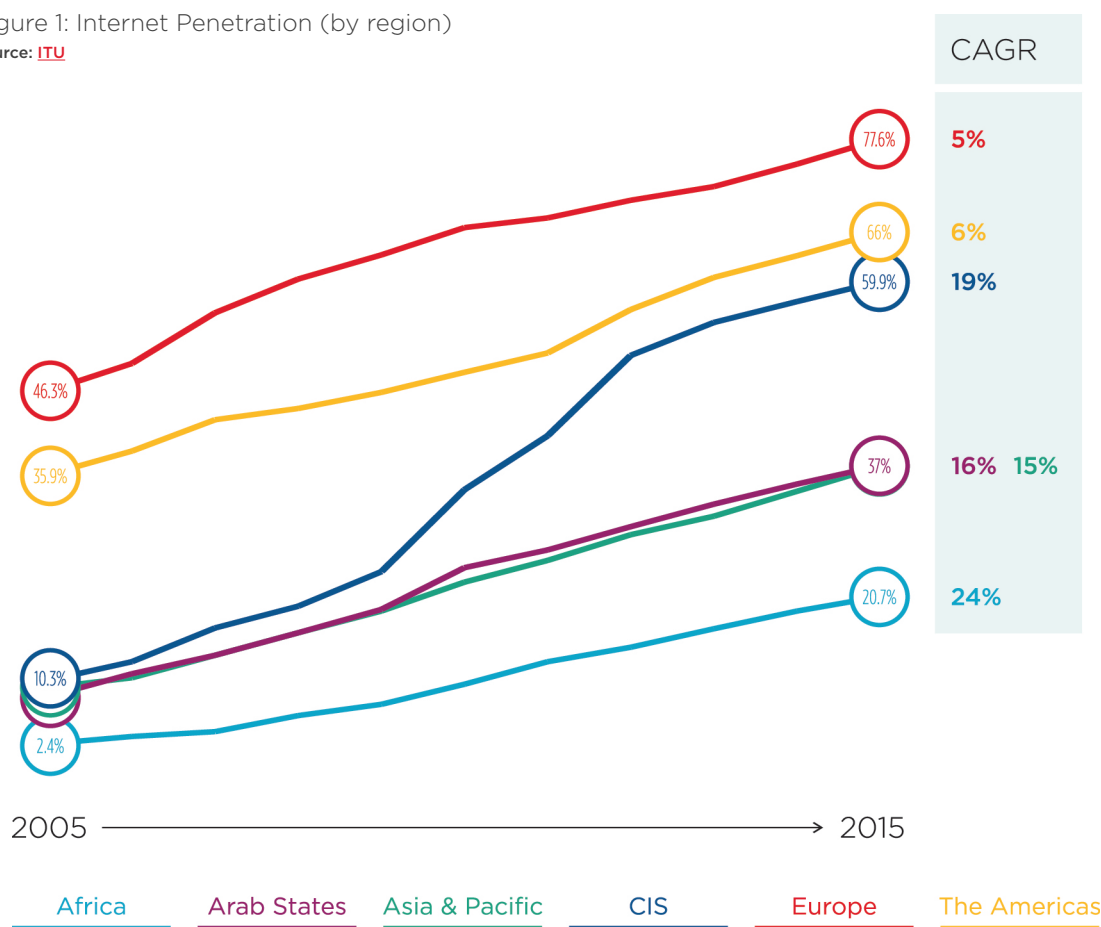
# Background

## 1.1 Access to the internet is growing enormously, but barriers remain

The mobile industry has contributed greatly to the growth of the internet. Ten years ago, less than 10% of the population in Africa, Asia and the Pacific and the Arab world were online. In the decade since, this has increased dramatically, mainly driven by the growth of mobile. For illustration: between 2010 and 2015, fixed line broadband penetration in the developing world had a compound annual growth rate of 11% compared with 54% for mobile broadband.<sup>5</sup>

Figure 1: Internet Penetration (by region)

Source: [ITU](#)



The expansion of telecommunications in emerging markets has been very good for the mobile industry. Since 2010, the vast majority of growth in the mobile industry has come from the developing world. 94% of the 1.05 billion subscribers added since the beginning of 2010 have come from emerging markets.<sup>6</sup>

Today, there are 2.83 billion subscribers (a penetration rate of 46%) across the developing world, with a further billion forecast to be connected over the next five years.<sup>7</sup> The significance of this growth is underscored by the low levels of fixed-line infrastructure and PC ownership across the developing world.

<sup>5</sup> [ITU](#): Between 2010 and 2015, mobile broadband subscriptions went from 4.5% to 39.1%, fixed line broadband increased from 4.2% to 7.1%

<sup>6</sup> [GSMA Intelligence](#) (Q1 2010 - Q1 2015)

<sup>7</sup> [GSMA Intelligence](#) (Q2 2015)

For example, rates of subscription to the mobile internet are twice as high as those who have access to a computer in the home having been at comparable levels five years ago. This is a trend that will continue over coming years. However, while this represents a huge opportunity, for both the individuals coming online and the mobile industry as a whole, there are significant structural barriers impeding further growth of the internet. Crucially, we know that access to smartphones does not necessarily correlate with increased internet usage. Tentative estimates suggest that there may be as many as 250 million current Android owners who do not use the mobile internet.<sup>8</sup>

Moreover, it is still the case that only a minority of the world's citizens are online. Globally, 4 billion people remain offline, 90% of whom are in the developing world.<sup>9</sup> The GSMA, along with others<sup>10</sup>, have identified these four broad issues as being the key barriers to internet access (outlined in Figure 3 below)

Figure 2: Computer access and mobile access: Africa

Source: ITU and GSMA Intelligence

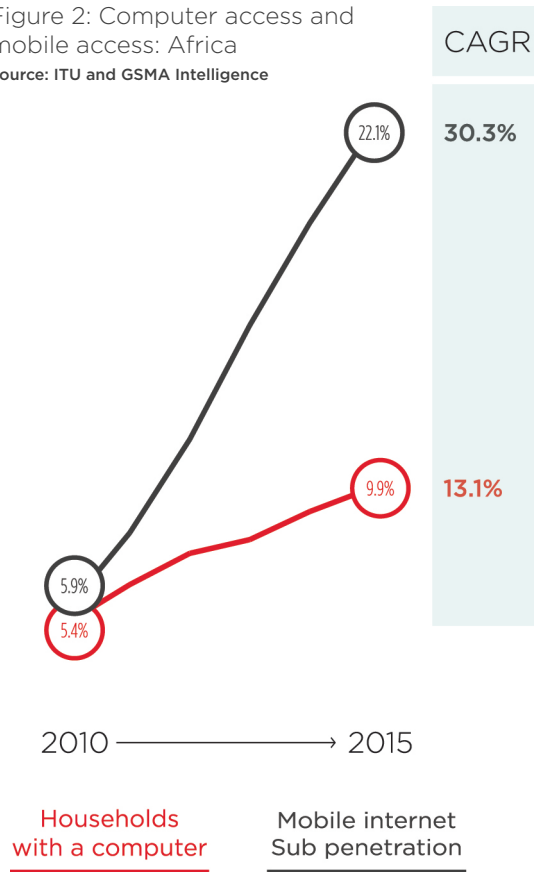


Figure 3: Barriers to internet access

Source: McKinsey & Company, [Offline and falling behind: Barriers to Internet adoption](#), October 2014



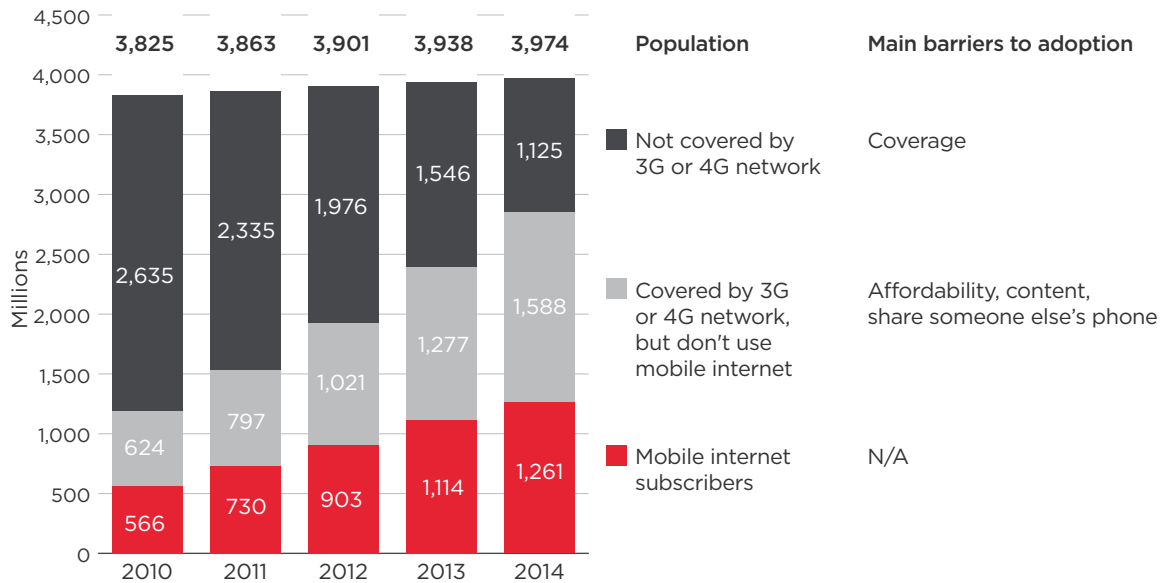
On the infrastructure side, despite clear gains in coverage in recent years (see Figure 4 overpage), a number of people continue to lack access: 10% of the global population lack access to basic voice and text services, and roughly 30% lack access to 3G/4G mobile broadband internet. Pertinently, the vast majority of these uncovered populations are low income and live in the rural regions of Asia and Sub-Saharan Africa.

<sup>8</sup> McKinsey, [Offline and falling behind: barriers to Internet Adoption](#)

<sup>9</sup> ITU

<sup>10</sup> These are best summarised in GSMA's Digital Inclusion report (November 2014) and McKinsey's, [Offline and falling behind: Barriers to Internet adoption](#) (October 2014)

Figure 4: Network Coverage (by Population): Asia

Source: GSMA Intelligence, [Closing the coverage gap - the view from Asia](#)

In terms of affordability, the price of an entry-level smartphone continues to fall. In many emerging markets, one can now find a host of sub-\$50 devices with a rapidly improving user experience. In India, for example, one can easily find devices from vendors like Intex, Spice, Karbonn, Forme, and Micromax that are able to meet basic consumer expectations: making phone calls, connecting to the internet, and taking photographs.<sup>11</sup> Compared with higher-end models, these phones suffer from issues such as poor battery life, limited functionalities or poorer build quality. Nonetheless, it should be noted that these devices match or exceed the specifications and feature set of the original iPhone, which launched in 2007 at \$499-\$599.

<sup>11</sup> Quartz, [\\$30 smartphones are here and they're getting better every day](#)

Figure 5:

# CHEAPEST SMARTPHONE: COST AT LAUNCH (INDIA)

Source: [Jana](#)





The falling costs of handsets have also been accompanied by the falling cost of data. In the last three years, there has been a steady decrease in the cost of an entry-level data plan. In Latin America for example, the average price of an entry-level smartphone data plan (with a 250MB usage cap) fell from US\$17.68 in 2010 to US\$8.33 in 2013, a decline of 52%. Market forces will continue to drive down the cost of owning and running a mobile internet enabled device. However, here it is essential that governments embrace policy that is friendly to consumers and to continued investment. Taxation can often make up 20-40% of the total cost of owning a mobile.<sup>12</sup>

Overall, progress continues to be made on access, infrastructure and affordability. But barriers remain, particularly related to the dearth of locally-relevant, language and context appropriate content.

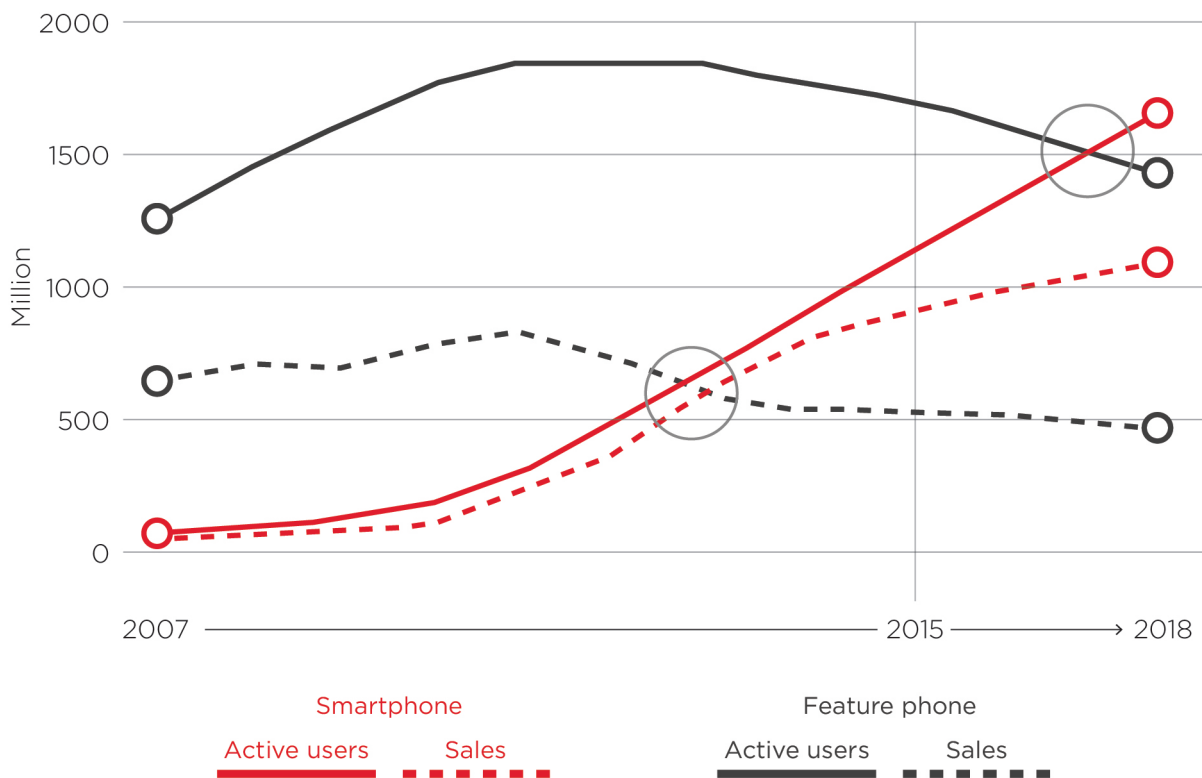
The need for local content, and for user capabilities, has begun to become noticed by Silicon Valley technologists. In an April 2015 interview, Facebook chief executive Mark Zuckerberg remarked: "I thought what was necessary to connect everyone was new technology and a change in the economic structure. Instead, it's all about content and awareness."<sup>13</sup>

## 1.2 The opportunity presented by smartphones: why they are significant

These trends mean that it is now possible to foresee a future in which most people have access to smartphones, even among rural and low-income populations. Smartphones have already overtaken feature phones in terms of global sales. While presently only 30% of all connections in the developing world are smartphones, by 2020 we expect that to be reversed, with 70% of connections projected to be smartphones.<sup>14</sup> It is therefore appropriate to plan investments to leverage a world in which most people will have access to a device which is essentially a general purpose computer.

Figure 6: Smartphone sales and users: Developing World

Source: [GSMA Intelligence](#)



<sup>12</sup> GSMA, [Mobile Taxes and fees: A toolkit of principles and evidence](#)

<sup>13</sup> Wall Street Journal, [Tech Companies Struggle to Get World on Internet](#), April 21, 2015

<sup>14</sup> GSMA Intelligence, [From feature phones to smartphones, the road ahead](#)

As a platform for delivering services and connecting people, smartphones unlock new business and economic opportunities. One reason for this is a more open and flexible value chain. Unlike the more technically constraining feature phone, smartphones are a more open and programmable platform. This matters, as it invites a broader diversity of players to the space. Mobile internet services can be based anywhere in the world. This means that they can be updated and reconfigured without making modifications, either to the network or to devices on the edge of the network. In contrast, systems like USSD are centrally coordinated, where all content and services must be tested, approved, and deployed by the operator.<sup>15</sup> As a result, the barriers to new and innovative services are far higher than in the internet industry.




The more robust distribution channels of smartphones make it easier and cheaper to create, publish, host and distribute content that addresses local needs. Smartphone content and services can be delivered in a number of ways, from web browsers and app stores to social networks and messaging apps. These platforms are 'open' by degrees—each offering different means of facilitating access, interoperability, publishing, sharing, and monetisation. The net result is that there are many more ways to reach and serve the needs of potential customers.

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<sup>15</sup> Unstructured Supplementary Service Data (USSD) is a GSM network messaging service that allows for near real time sessional communication between the user and a network application.

Figure 7:

## THE EVOLUTION OF A LOW COST MOBILE OVER THE LAST DECADE

	INTRODUCTION	APPLICATION RUNTIME	INPUT	ADDITIONAL INPUT / SENSORS	DISPLAY	APPROX PRICE AT INTRODUCTION (USD ADJUSTED)
 Basic phone (Nokia 1110)	2005	SMS / USSD (INSTALLED AT CARRIER LEVEL)	KEYPAD ENTRY	VOICE	1"	\$35
 Feature phone (Micromax X114)	2010	SMS, EMS, MMS, WAP 2.0/XHTML	PREDICTIVE TEXT ENTRY	VOICE	1.5"	\$45
 Smartphone (Karbonn Smart A52 Plus)	2015	ANDROID 4.2, WIFI, 2G	TOUCH MANIPULATION; DYNAMIC INTERFACE	VOICE	3.5"	\$45

**OVER THE YEARS, TECHNOLOGICAL ADVANCES IN ENTRY-LEVEL MOBILE PHONES HAVE OPENED UP SIGNIFICANTLY GREATER OPPORTUNITIES FOR USER-GENERATED CONTENT AND USER-LED CONTENT CREATION.**

The costs of designing for the needs of low-income populations (and reaching them) are likely to fall dramatically as smartphone growth continues. As a result, smartphones have the potential to open up a more vibrant ecosystem, with a growing number of commercial competitors, increasing consumer choice. This has the potential to drive both economic development, digital inclusion, and access to knowledge—but only if the ecosystem is generating valuable, locally relevant content.

## 1.3 The role of smartphones in lowering the barriers to content creation

Smartphones also open up new opportunities for content creation beyond what has been possible through feature phones. This is due to their large touch displays, sensors, built-in cameras, faster processors, better connectivity, and readiness for more open and general purpose computing. Smartphone content is richer and more tactile and visual than feature phone content. This shift away from text only content is significant in that it makes it more likely that lower-literacy users will be able to produce and retrieve content that is more likely to be relevant to them.

This global growth in smartphone ownership also creates the possibility of niche markets that can be catered to by any producer in the world. In Silicon Valley, this opportunity is sometimes (and optimistically) described as the possibility of “selling to everyone that it is possible to sell to.”<sup>16</sup>

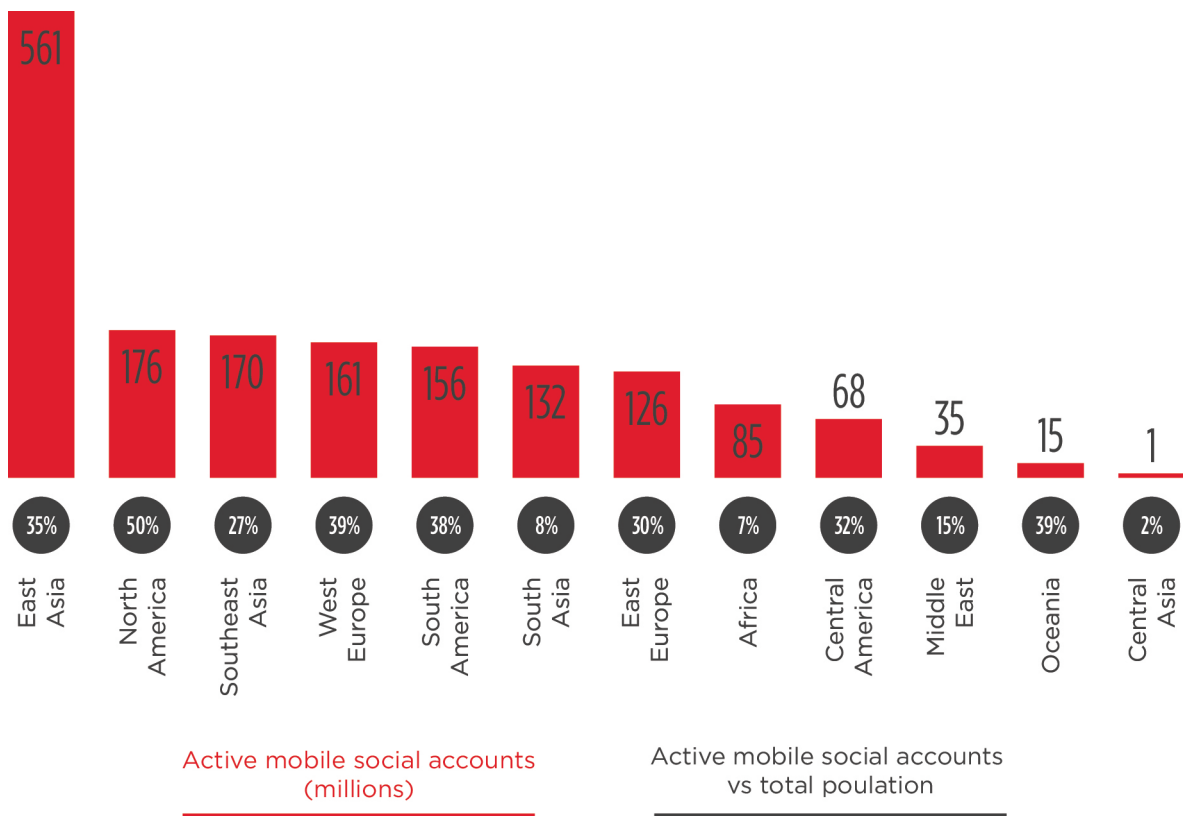
The rapid growth of social media and messaging platforms is enabling organic sharing and discovery of mobile internet content among users. A large percentage of the user bases of platforms such as Facebook, WhatsApp, WeChat and Viber are now comprised of users in emerging markets.<sup>17</sup>

These services support the growth of ‘user-generated content’—individualized contents such as posts and photos that are created for a hyperlocal audience. In aggregate they take on a broader significance. They surface and recommend content to users that is, by definition, targeted and relevant—such as information about family, friends, and community events. As a result, they have been the entry point in the internet for many of those now coming online. For this reason, many mobile operators in emerging markets have used Facebook as the hook for selling data services to new users, either through extensive marketing, ‘zero rating’ the service, or through partnering with Internet.org.

<sup>16</sup> Benedict Evans, [Connecting the World](#)

<sup>17</sup> This is also discussed in the GSMA Connected Women and Digital Inclusion report, [Accelerating Digital Literacy: Empowering women to use the mobile internet](#)

Figure 8: Monthly Active Social Accounts

Source: [We Are Social](#), January 2015

Yet this kind of user-generated content is a necessary, rather than sufficient, condition to creating a healthy local content ecosystem. The content contributed on these platforms is owned, segmented and monetized by a small number of platform operators, and the structures provided by these platforms are more centralized and rigid when compared to the wider “open web”.

This reliance on a small number of platform providers makes it harder for local players to break in, innovate, and make money in a world where network effects mean that the platforms that move first have an inherent advantage. If content is concentrated and centralized in a few platforms, there is a risk that innovation and local participation in shaping the content ecosystem will be limited. Already, we can see that local developers in much of the world, particularly in Africa and Latin America, have very limited success breaking into the top 600 positions of either of the two major app stores: Apple’s App Store and Android’s Play Store.<sup>18</sup>

Therefore, an important question for those working in the mobile industry and digital economic development is: how can smartphones become a platform for the subscribers themselves to create value? Here, it is necessary to look beyond user-generated content as it is conventionally understood. Instead, it is appropriate to consider how users of the mobile internet could have a role in shaping the internet itself, creating more vibrant local content ecosystems in the process.

<sup>18</sup> Brian Pon, [Locating digital production: How platforms shape participation in the global app economy](#)

## 1.4 The role of user capabilities in generating local content

The “local content gap” has been studied and documented extensively.<sup>19</sup> It matters because locally relevant content is important, as it is a lynchpin for mobile internet adoption. Without it, the mobile internet has less relevance and new smartphone users have fewer incentives to pay for data. This must be addressed to unlock subscribers and revenues for the mobile industry, as well as the wider social and economic benefits of smartphones for users.

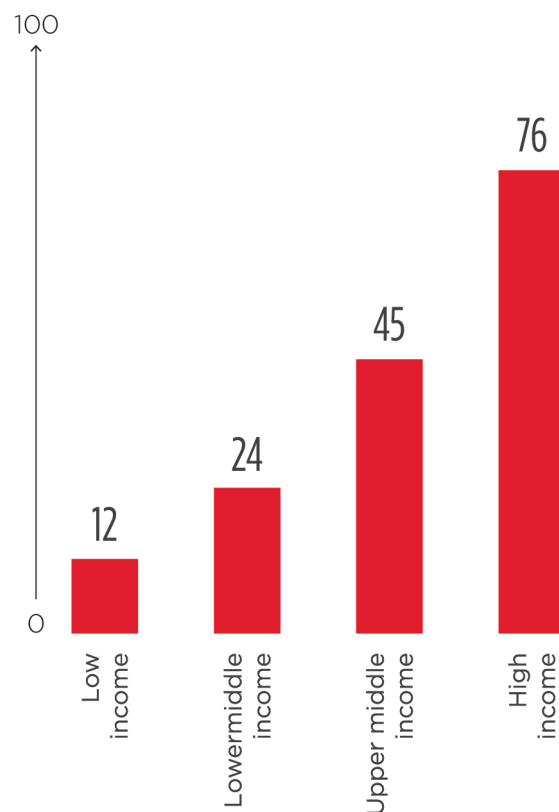
Due to the tough economics of content generation and a lack of ‘long-tail’<sup>20</sup> content producers, many regions and niches are left underserved. A quantitative measure of this is provided by The Web Index, which provides a way to compare countries and regions in terms of the development of the web. On the ‘Relevant Content’ metric, a lower income, newly mobilising country like Bangladesh scores 20.77 (out of 100), in comparison with a middle-income country such as Indonesia, which scores 38.30. The United Kingdom is the benchmark country, scoring the maximum of 100.

The local content gap is a particularly difficult problem to tackle, as the existence of content itself is likely to be a generative factor behind the production of further content.<sup>21</sup> Digital content can be remixed, repackaged, and recontextualized to address different needs and niches (e.g. open data sets, photo archives, and Wikipedia). However, in many parts of the world, there is a weak core of existing content to draw on. As a result, digital content production is a good indicator of a country’s overall level of digital economic development.

To catch up, the generation of local content in low-connectivity regions will require a distributed effort. For this to happen, there will need to be an increase in user capabilities. In recent decades, the development sector has focused on the capabilities of the individual.<sup>22</sup> According to the capabilities approach, development is best conceptualized as advancing human well-being and freedom. Poverty is seen as a deprivation of basic capabilities, rather than merely as low income. Others have extended the capabilities framework to the realm of Information and Communications Technologies for Development (ICT4D).<sup>23</sup> One application of this framework suggests that users need to be taught how to make use of the technologies available to them, in order to better leverage digital services that can improve their well-being. Ultimately, the more users understand the digital world, the more likely they are to become engaged in creating content.

Figure 9: Relevant Content Score: Average (by Income Group)

Source: [Web Index](#)



19 See the 2014 Innovations Journal ‘[Digital Inclusion: The Vital Role of Local Content](#)’ and the GSMA’s ‘[Local World - content for the next wave of growth](#)’ and ‘[Local Content, Digital Skills and International Development](#).’

20 ‘Long tail’ content producers refers to people producing content for small, niche audiences. This concept was popularised by the technology writer [Chris Anderson](#).

21 Mark Graham, [Uneven Geographies of User-Generated Information: Patterns of Increasing Informational Poverty](#)

22 Amartya Sen, [Development as Freedom](#), 1999

23 Annika Andersson, Åke Grönlund & Gudrun Wicander (2012) “Development as freedom – how the Capability Approach can be used in ICT4D research and practice, [Information Technology for Development](#)”



## 1.5 Local content creation: adopting a smartphone mind-set

At present, many in the Mobile for Development (M4D) sector make investments in local content based on a feature-phone centric, “service delivery” mentality. Here, there is a clear separation between mobile content producers and passive consumers. Given that smartphones may dissolve this separation over time, the transition to smartphones will require a change in thinking.

At present, most services in areas like agriculture, health or gender are ‘push’ information services.<sup>24</sup> While there are local content initiatives that have successfully found overlap between commercial interests and social benefits, few have reached scale. Moving rapidly into an era of more affordable and widely available smartphones, much of the conversation in the M4D community to date has been about how to provide similar information on these new platforms. The need for health, education, agriculture and other traditional M4D services will certainly grow during the transition to smartphones. However, vibrant digital economies will also require the participation—and production of information—from agricultural workers, students, teachers, civil servants, entrepreneurs and others.

The shift to smartphones represents a potential opportunity for users to better contribute and shape those platforms, and enable an organic proliferation of locally produced content. At the very least, they will enable users to give feedback on, and therefore influence the creation of, content that is relevant to them. The greater functionality afforded by these devices will enable new forms of interaction and the creation of valuable content in these areas. This has the potential to support and bolster livelihoods as well as radically enhance the level of engagement, and relevance of the information shared by development organisations.

This does not mean that all content producers in emerging markets will be formally employed in this capacity. Many would be motivated by other factors such as social capital, their reputation, and the intrinsic benefits of participation in online communities. Here, we can consider emergent profiles of content creators, such as:

- **Makers:** relatively well educated youth who are more digitally sophisticated and comfortable with technology. They participate in learning and discovery and engage in experimenting, exploring, building, tinkering and remixing content.
- **Professional amateurs:** innovative, committed, and networked amateurs working to professional standards. An example of this group are those taking a second or third job on the side helping to digitize local small businesses or providing media production services.
- **Social production and hobbyists:** In this category we have phenomena like Wikipedia editors and other forms of crowdsourcing, where users create content in areas reflecting their interests and passions.

These kinds of amateur content creators are the key to unlocking the smartphone opportunity.

<sup>24</sup> A ‘push’ service is one where content is pushed out one way, typically via voice message or SMS

# Chapter 2: Approaches to user capabilities and content creation

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To date there has been limited research into how new smartphone users perceive and use the mobile internet in emerging digital economies. Greater understanding here must precede any interventions which may increase the level of user capabilities (and ultimately the number of people who become content producers).

To better understand the coming smartphone transition, we undertook a six-month field research program based in three markets, where access to smartphones, and the internet have been increasing rapidly in recent years: Bangladesh, Kenya, and India (links to country-specific reports can be found in the Appendix). This research had a dual purpose: first, to better understand the motivations and constraints of those coming online; and second, to understand what kind of user-centred innovations could be introduced to make content creation easier. The insights gained from the field research informed the design of the Webmaker mobile content creation software, which was subsequently piloted and tested with users in each region.

## 2.1 Barriers to mobile internet adoption

### 1. The internet is not something many people in emerging markets feel they can be a part of

The availability of networks and affordability matter a great deal. Throughout our research, the issue of data cost was constantly raised. However, what was also clear, is that for huge numbers of potential users, the internet is not something that they feel they can be a part of. These users were disproportionately found in certain groups. Examples of these users can be found in Figure 10 below.

- **Those living in rural areas:** usage of the internet is lower in rural areas. This is not particularly surprising, given the fact that network access, education and incomes are lower. However, beyond this there is also a strong psychological barrier whereby users in rural areas don't see the internet as something that relates to their lives.
- **Women:** in many societies, the web is perceived to be an 'inappropriate' place for women, where they are likely to be overexposed, immodest, or run afoul of conservative social mores. This affects a woman's ability to access the web and their freedom to publish web content.
- **Those with lower levels of education:** Users with low levels of formal education fear the unknown. They often associate web services with risk for their children and themselves.
- **The elderly:** Elderly users, even when drawn from more affluent segments in society often feel that the internet is irrelevant or a threat to established culture or traditions.

Figure 10:

## USER PORTRAITS



**LAKSHMI AND RAJI BEIN**  
ARTISAN, GUJARAT  
MICRO-BUSINESS OWNER

Lakshmi and her daughter live together in a popular neighborhood of Ahmedabad. They are artisans and experts in creating handmade quilts and embroideries. In this region, like in many others in India, this knowledge is passed from generation to generation. Lakshmi does not speak English, while Raji is able to roughly understand it and speak basic sentences.

She makes approximately 125 INR (2 USD) per piece made. She is proud of what she has accomplished, as she has been able to build a house for her and her family, buy a TV and live comfortably. Their challenges today are mostly related to the irregularity of their orders and their dependency on wholesalers.

### ACCESS TO TECHNOLOGY AND PERCEPTION OF THE INTERNET

Both Lakshmi and her 21-year-old daughter own a Nokia feature phone. In their living room, there is a TV where they watch entertainment shows and listen to music. They are not using the Web today as it is against the values of their community and their caste, in which women are discouraged from using online services.

Lakshmi is on an online, government-built index, where she and other artisans are featured. However, she is not aware of the index, and did not know that she was featured on it. She currently doesn't use the Web.



**ABHIJIT**  
MAHARASHTRA  
SHOP OWNER

Abhijit owns a stall in a very low income neighborhood. He has owned this stall for 40 years selling every-day items and phone recharges. As a result, he has a good understanding of what is happening in his community. He is married, has two daughters, and struggles to speak and understand English.

While his family used to live in one room next to the shop, through savings and hard work they were able to move out of the slum to a comfortable home a few kilometers away. His two daughters have been successful in their studies and their jobs.

### ACCESS TO TECHNOLOGY AND PERCEPTION OF THE INTERNET

Abhijit owns a feature phone, and his family has a TV and music system in their house. His two daughters use smartphones and computers. Satisfied with offline social interaction, and enjoying entertainment via television, Abhijit never feels the need to go online as he sees it as useless and complicated. He struggles to see how the Web would be relevant to his business.

Abhijit is reluctant to connect to the Web mainly because he feels like it is too complicated for him and that he does not understand it.



**MAHALINGAM**  
RETIRED  
DELHI

Mahalingam moved to Delhi 40 years ago from Tamil Nadu with his wife and four children. With limited education (he left school at 11) and the unfavourable political and economic situation in his home region, he hoped to find work in Delhi. He sold his wife's jewellery to move to Delhi with his family and ended up doing various construction jobs. Eventually, he got a job working as a porter at Delhi airport in the early 1980s. Finally, until last year, he worked in a fabric shop. Now, Mahalingam is 74 years old, and retired.

He receives a state pension of 1000 INR per month (US \$16) and lives with his son, who provides food for them both.

### ACCESS TO TECHNOLOGY AND PERCEPTION OF THE INTERNET

Mahalingam does not have a personal phone but shares a basic feature phone with his family. While he does make and receive phone calls, he is unaware of any other features on his mobile device and has never heard of the internet.

## 2. Non-English speakers feel excluded

In markets where English is spoken as a second language, the predominance of English language content negatively affects the esteem of people with low levels of education, creating a stigma that prevents users from venturing online. This is compounded by the fact that while most people access the web through mobile devices, mobile content creation is not ergonomic. There are very few creative tools adapted to mobile form factors and input methods; these tools are generally built for Roman character input and assume high functional and conceptual literacy. This can make text entry in languages not using Roman script (e.g., Hindi or Arabic) an act of huge complexity.

## 3. Many who have come online have not progressed beyond social media

Many of the users who have made it online limit their use and understanding of the data services to social media, and specifically Facebook and WhatsApp (or their local equivalents) which are dominating today's online interactions. A lack of digital skills and models for navigating the web, as well as discovering and installing apps, further compounds users' inability to develop their own understanding of how to use, leverage, or create digital content.

Even when users become interested in creating digital content, they face challenges related to lack of awareness and available tools. The latent motivations to create content and be a proactive user of the Web are not represented in current content creation pathways and tools. Mobile operating systems are optimised for utility, ease of use, and consumption—the app publishing and discovery models assume that content production takes place on desktop computers.

Despite this, we found that many youth are eager to use these platforms as an entry point to developing deeper competencies with digital tools. Here, the relative youth of developing economies is an advantage. The median age of the world's less economically developed nations is just 19.5, compared to the global median of 29.6 and a median in countries with very high human development of 40.2.<sup>25</sup>

Figure 11: User portraits

**VASANTHI**  
TEACHER,  
TAMIL NADU



Vasanthi teaches teenagers in rural Tamil Nadu. She has been teaching for more than 10 years and was assigned to her current school by the government. She earns an average public-school-teachers' salary (~250 USD a month) and lives in the village with her husband and children. While able to read English, she struggles to speak and understand it.

As part of her job, she is required to teach computer skills to the children, but the only technology available in the school is a very old TV and music speakers. Vasanthi dreams that more and more children complete their education, despite a tendency for them to drop out.

### ACCESS TO TECHNOLOGY AND PERCEPTION OF THE INTERNET

Vasanthi owns a feature phone, and uses it for calls and sending SMS. Although she has been online once to discover Facebook, she does not use the Internet regularly. She would like to use it more, but only if someone teaches her.

Currently, she cannot afford a smartphone and she would be uncomfortable purchasing data plans for her feature phone, since she sees little use for it. Vasanthi would be enthusiastic to learn more about the Web. She is eager to teach it to her students, so that they improve their education and skills but does not feel like this is possible today.

<sup>25</sup> UNDP (2015)

**JAMES**  
SMALL BUSINESS OWNER,  
NAIROBI



James recently started a small driving company in Nairobi, servicing the tourism sector. He has just hired another driver. He has no family yet but intends to marry and have children soon.

His dream is to grow his business. He is proud of his country and culture, and wishes to contribute to its expansion.

James's income is very irregular, as it depends on the tourism season. He is therefore conscious of his spending, such as his mobile data.

### ACCESS TO TECHNOLOGY AND PERCEPTION OF THE INTERNET

James owns a smartphone and spends most of his time on WhatsApp. He belongs to various groups on WhatsApp. Currently, he is raising money through the app for some friends who are getting married. He finds it very convenient since he is able to share and receive instant updates. Most of all, he appreciates the ease of sharing pictures, videos and the feeling of being close to his community.

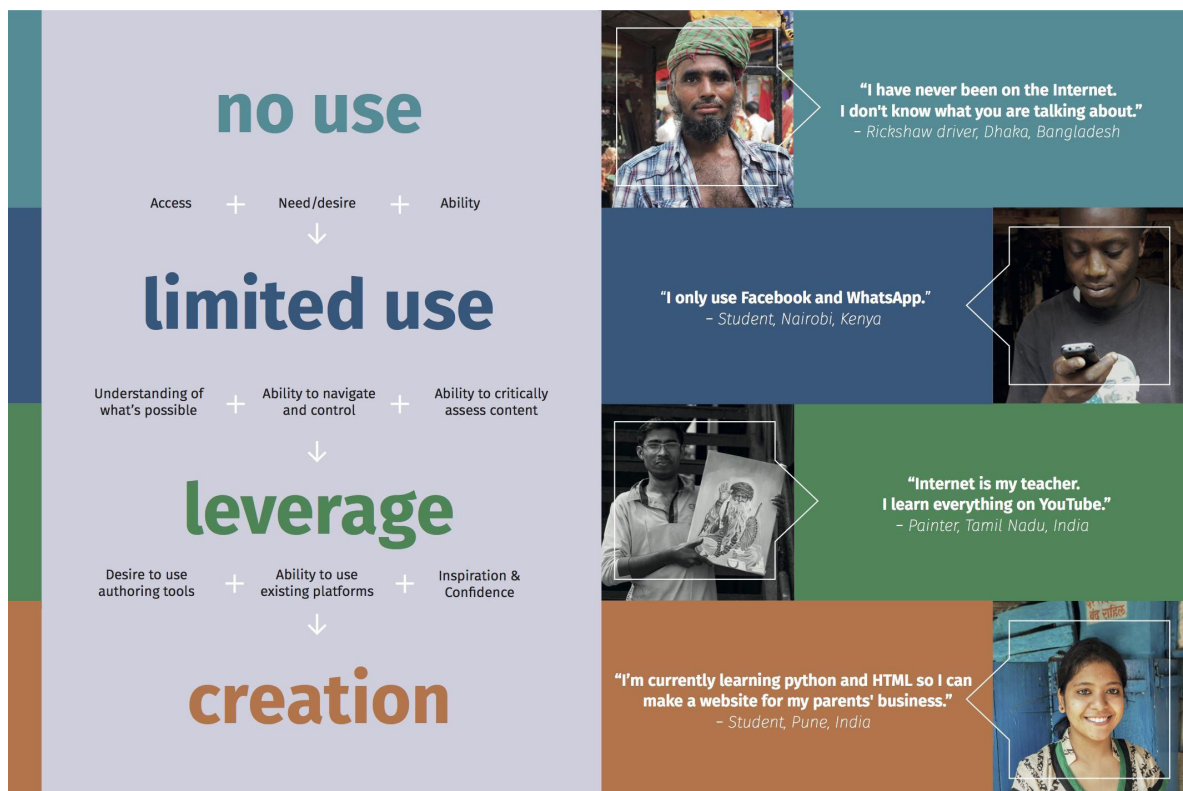
James dreams of seeing more web content in Kenyan languages. He deplores the absence of content in Kenya's 42 languages, which makes internet inaccessible for people living in remote areas, or lacking secondary education.

## 2.2 Helping users to understand and leverage the internet as a publishing platform

Regardless of nationality, gender or socioeconomic status, it is clear that many new users of the internet are held back by their lack of digital skills. Many have never considered the potential of the internet for addressing an audience beyond immediate family and friends. All of the content generation opportunities related to smartphones assume that users have a model for how to leverage the internet. However, many new smartphone users choose upgrade for features that have little to do with being online, such as a bigger screen or improved camera. Similarly, many are motivated to purchase smartphones for reasons of status.

Our research clearly demonstrates that significant numbers of users do not have the skills to get the most out of the device. Their exposure to technology has primarily been as content consumers. This means that they are less likely to acquire the content creation habits and conventions of internet users who were primed on more production-friendly platforms like powerful personal computers, with large displays, complex inputs, and a greater number of pathways to advanced creation.

Figure 11: GSMA and Mozilla Web Journey



Historically, user education in the mobile industry has focused on training users in specific functions, such as:

- Operating devices
- Using specific functions and account management tools
- Transacting with specific VAS services or mobile money

In development terms, digital literacy has occasionally been viewed as a luxury. Often this line of argument continues that digital literacy should not be a priority when even basic, written literacy is underdeveloped in a given country. However, the more customers know about digital life, the more inclined they are to pay for services (see section 2.4). The more they understand basic digital skills, the more they can help their friends, family and neighbours to understand the same (and increase their use of data and services). And the more overall digital know-how in any country, the stronger the talent pipeline for developing future innovative content and services.

As users journey from discovering basic mobile services they ultimately reach their potential to be content and service innovators. This is a progressive journey—as people gain confidence and become more fluent with technology, they unlock more intensive benefits for themselves and their immediate communities.

Connecting people is not the end game for digital economic development. Providing connectivity is a prerequisite, not only to deliver valuable content and services to people, but also to provide the opportunity for those people to create new value, which makes the digital economy more valuable for everyone involved. In this sense, the generation of local content is a means as well as an end.

The transition to smartphones may require a broader approach to customer education, in that the advent of more open smartphone platform requires a more general set of skills. Human-computer interaction (HCI) research has shown that skills and mental models learned in one application can be carried across all other applications.<sup>26</sup> Rather than teaching emerging markets users how to use specific applications, stakeholders should consider investing more broadly in applicable digital skills and ‘ways of thinking’. Our research in Bangladesh outlines one way of how this investment might be implemented (Section 2.4)

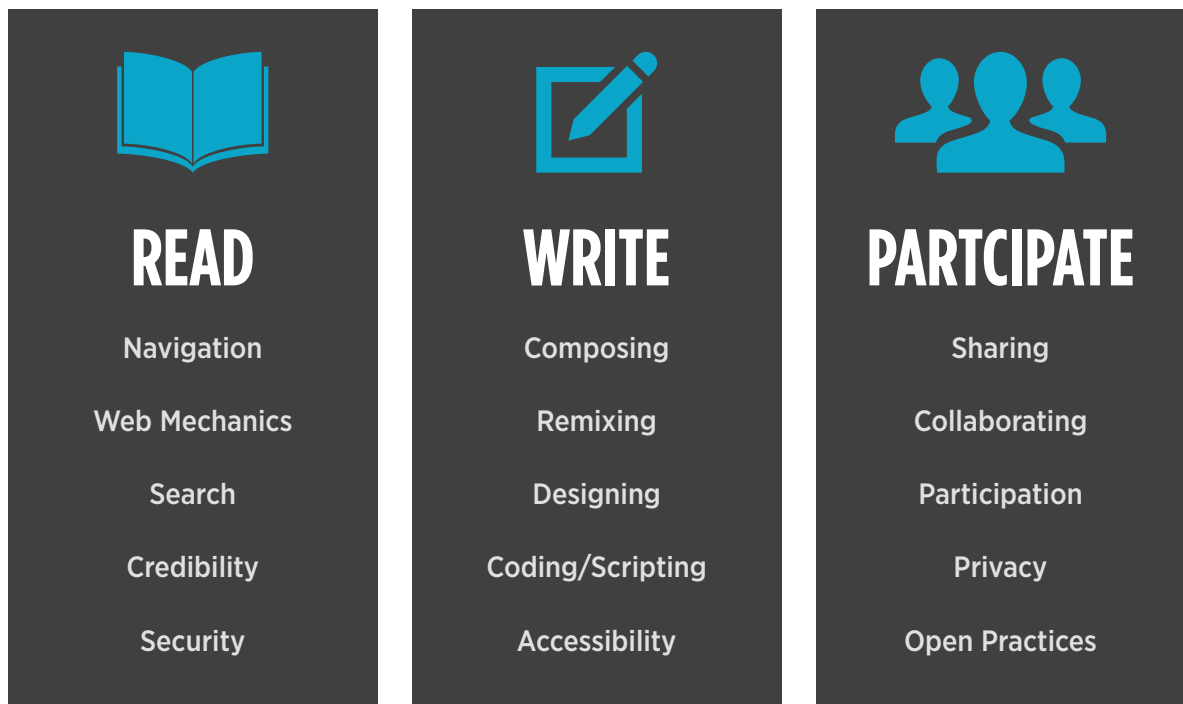
Unlike mobile users in the developed world, who have had many years of priming and consumer education, many of the people gaining access to mobile technology for the first time lack shared metaphors so foundational that interaction concepts can seem irrelevant or obscure. For instance, anachronistic design patterns (such as the concept of a ‘file’ system, iconography from the PC era, and subtleties in computer interfaces) are a barrier to new users picking up skills needed to explore and use information on the web. These can be learned, but only by experience.

Mozilla has developed a ‘web literacy’ framework to describe the skills and understanding needed to fully participate on web. Web literacy emphasises more holistic knowledge and understanding needed to read, write, and participate on the web, rather than competency with specific applications. A ‘web literate’ person need not understand all the mechanics of the mobile internet. However, they will have a range of ‘soft skills’ that enable them to supplement their own knowledge of the internet through directed exploration. Examples of this kind of behaviour include using a search engine to find information or knowing how to differentiate high quality information from spam.

<sup>26</sup> Robert Haskell. *Transfer of learning: Cognition and instruction*, Academic Press, 2000; Indrani Medhi, S. Raghu Menon, Edward Cutrell, Kentaro Toyama, [Beyond Strict Illiteracy: Abstracted Learning among Low-Literate User](#)



Figure 12: Mozilla's Web Literacy framework



A web literate person need not attain mastery of all these concepts—only those pertinent to their own context. This kind of literacy is essential for a sufficiently large number of users to make the journey from a basic to more complex understanding of the internet. Ultimately, only a subset of these people will become content producers. However, we believe that even marginal gains here will lead to a significant increase in the amount of content being produced in a given country.

## 2.3 User education and web literacy

Mobile phones will be the first experience many users in emerging markets have of using general purpose computers. Broad segments of these populations are unlikely to develop full mental models of the internet for many more years. Clearly, this is a significant barrier to mobile internet uptake, both in the short term (because people don't understand the potential benefits of using internet) as well as the long term (with fewer producing customers, the content ecosystem matures more slowly).

Digital media and learning research has shown that people develop sophisticated mental models for internet use through continued exposure to diverse applications, content and services. In this sense, users naturally gain mastery by simply experiencing the digital world. It's not unlike learning a new language. If someone learned a few phrases so that they could read menus in restaurants and ask for directions on the street, they could not be said to be fluent. Yet that type of phrase-book knowledge is equivalent to the way most stakeholders are investing in mobile internet awareness today. To be truly fluent in a foreign language, you must be able to articulate a complex idea or tell an engaging story. Analogously, being digitally fluent involves not only knowing how to use technological tools, but also knowing how to create things with those tools.<sup>27</sup>

<sup>27</sup> Papert and Resnick, [Rethinking Learning in the Digital Age](#)

Based on this research and pedagogical philosophy, we suggest the following three key principles when designing a curriculum:

### 1. Learning through interest

- When people derive satisfaction from engaging with a topic or activity, they naturally want to learn more about the topic or increase their skill level in the activity in question.
- Curiosity arises when learners are confronted by unexpected gaps in their understanding or ability.
- In order to elicit curiosity, a designer can create a situation in which the learner's expectations are subverted by their observations or experience

### 2. Learning by doing

- Researchers have identified a variety of cognitive skills, whose underdevelopment poses barriers for realizing useful interaction on ICT applications.
- The effective use of the internet requires developing skills in mental spatial orientation (i.e. building a mental model for how to navigate digital spaces). These skills are best acquired in practice and cannot be taught abstractly.
- New learners, particularly those with lower levels of literacy, tend to learn better in highly specific contexts that are embedded in concrete situation and practical experience.<sup>28</sup>

### 3. Learning through collaboration

- Peer-based learning has unique properties that drive engagement in ways that differ fundamentally from formal instruction.<sup>29</sup> Much of the research into the use of technology use in low income environments has arrived at the conclusion that it is more accurate to consider people as embedded social actors rather than individual users.<sup>30</sup>
- Collaborative user experiences can lessen intimidation caused by technology.
- Social learning can also help lower literacy users internalise complex systems, as friends and family members show the way. This helps lessen the cognitive stress of paying attention and memorising cues about what might be coming up or remember where they came from.<sup>31</sup>

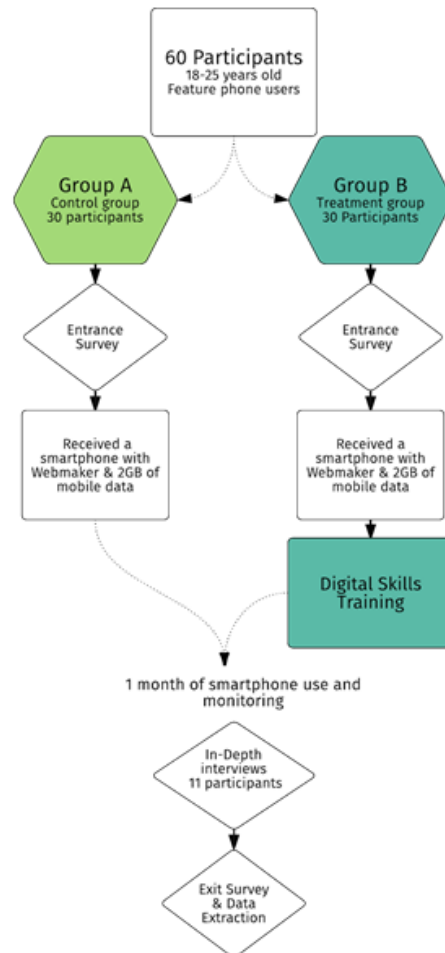
<sup>28</sup> Indrani Medhi, S. Raghu Menon, Edward Cutrell, Kentaro Toyama, [Beyond Strict Illiteracy: Abstracted Learning Among Low-Literate Users](#)

<sup>29</sup> Heather Horst and Mizuko Ito, [Living and Learning with New Media: Summary of Findings from the Digital Youth Project](#)

<sup>30</sup> Syed Ishtiaque Ahmed, [Ecologies of Use and Design: Individual and Social Practices of Mobile Phone Use Within Low-Literate Rickshawpuller Communities in Urban Bangladesh](#)

<sup>31</sup> Kathryn Summers and Michael Summers, [Reading and Navigational Strategies of Web Users with Lower Literacy Skills](#)

## 2.4 The role of user skills and capabilities in mobile data consumption: study in Bangladesh



To better understand the relationship between user capabilities and engagement with the mobile internet, we constructed a pilot study in which 60 young people aged 18-24 were given a low-cost smartphone and a 2GB data plan. Half of the participants were randomly selected to undergo a condensed 2 hour digital skills training with a Mozilla community member in Bangladesh. The other half were the control group and received no training. We observed both groups' use of the smartphone over a 4 week period and compared the results.

Here, we wanted to test two hypotheses:

1. Learning digital skills at the time as they received a smartphone would result in a higher level of engagement with the mobile internet, when compared with the control group
2. Users who received the digital skills training would explore more and different applications, when compared with the control group

## 2.4.1 Methodology

This experiment was run as small scale randomised control trial. With our local partner, the Bangladeshi research and training NGO **Dnet**, we selected and divided 60 non-smartphone owners through a block randomisation process, so that the groups were well balanced in terms of socioeconomic background, access to technology, and gender into two groups:

- Group A: 30 young people aged 18-24, male and female
- Group B: 30 young people aged 18-24, male and female

Prior to the study, most of the participants were using feature phones. 68% (41/60) of the participants were feature-phone users that lacked internet access, with 32% (19/60) owners of feature-phones with access to the internet.

Each participant received a \$79 phone running Android 4.4.2 with 2GB of data to use as they wished.<sup>32</sup> However, Group B also received a basic digital skills on-boarding, introducing them to smartphones, internet, mobile applications and the Webmaker content creation software. Each participant, regardless of their group assignment, participated in an entrance interview, in order to assess their understanding and web literacy skills before they received the smartphone; and an exit interview after the four week trial, in order to track any changes in attitudes.

## 2.4.2 Contents of the training

For this study, we designed a “web literacy basics” curriculum that attempts to address the typical questions that first-time smartphone users would want answered. The training was designed to facilitate strong participation through using Mozilla Foundation’s principles of teaching, such as interest-driven discovery, hands-on exploration, and peer-to-peer learning. This training was designed to cultivate more holistic mental models for the internet as described in this report.



Group B received a training session facilitated in Bengali by Mozilla volunteers in Bangladesh. This covered the following topics:

- **Smartphone discovery:** participants explored and analysed the differences between smartphones and feature phones.
- **Internet discovery:** participants reflected about their understanding of the Internet, the different information that can be found online, and browsed the internet in small groups.
- **Mobile applications:** participants explored the differences between mobile applications, web browsers and the internet in general. Participants also learned to navigate the app store and install mobile applications.
- **Living online:** learners discussed and explored different aspects of online identity and privacy.
- **Content creation** (via introduction to Webmaker): learners were introduced to Mozilla Webmaker, an Android application for mobile content creation.

## 2.4.3 Findings

### Digital Skills training led to increased engagement and higher data usage

Both groups displayed a strong interest in the mobile internet, both using close to their 2GB data allowance. However, notably there was a 17% higher data usage among the group that received the training (2,100MB on average) compared with group that didn't (1800 MB). Moreover, while we didn't test the users willingness to pay in this test (in that users received data for free), it is interesting to note that a third (10/30) of those whose received training exceeded the data allowance given to them as part of the study, compared with only 5/28 in group A. This suggests a higher level of engagement, interest and understanding amongst those who experienced the training.

However, our second hypothesis was not supported by the data. We found that the range of applications used by participants was broadly similar. Those who received the training used a similar number of applications on average (18.8 applications in the group that received training compared with 17.4 among those that didn't). Interestingly, users in both groups used the phone for similar purposes, and users in the treatment group were no more likely to use web browsers than those in the control group, despite the training that the treatment group had been given in using a web browser.

### Training led to increased agency and creative confidence

Many of the participants heard about creating for the web for the first time during the training. Following this, they expressed an ambition to create their own projects and share them online and to learn and to be guided in their creations. Participants who received training, and discovered Webmaker in the process, expressed their surprise to discover that it was possible to create their own web-pages and projects, in general and especially from their mobile device.

We observed a difference between the two groups regarding the desire to create content for a wider audience, in particular, the concept of sharing content outside a close circle of friends.

### The importance of peer learning

A key theme that emerged from the interviews was the role of word of mouth, social learning and peer-to-peer sharing in understanding the potential of smartphones. Participants revealed that prior to the experiment, they relied on their friends to learn how to use a smartphone or the internet. This suggests a natural inclination toward peer learning. In our sample, it was not uncommon for participants to find at least one smartphone in a circle of friends. A number of the participants displayed an eagerness to become teachers to their peers and explained to us that they regularly share their knowledge. This reflects a body of research suggesting that social learning is key to the successful integration of technology.<sup>33</sup>



"I did not have any ambition to create a website but now, I want to blog about community problems. Now that I have seen Webmaker I want to learn how to create a blog."



"I showed Webmaker to my older brother and he said it would be really good for us to make a blog. So it clicked in my head that I could do that for me"



"It is my first conversation. Before the training I had no idea about web making, blogs or websites. Before the training, I knew nothing. Before the training I had no idea that we could create things. This learning motivates me and increase my interest to make."



"Nothing is difficult for me on the smartphone, because my friends have one, and so they showed me."

<sup>33</sup> Squire & Dikkers, [Amplifications of learning: Use of mobile media devices among youth](#)

## EXAMPLES OF DIFFERENT APPROACHES TO SKILLS DEVELOPMENT ACROSS SECTORS



### GRAMEENPHONE

In order to promote awareness and interest in the internet among young people, Grameenphone launched the i-Gen initiative in 2011. This constituted a roadshow involving a series of hands on demonstrations in schools. This first involved more than 870,000 students from 2,000 schools around the country. In 2015, the organizers refreshed the initiative by launching a nationwide competition where teams of students from the first stage had the potential to win prizes through internet and technology knowledge. The final level of the competition will be featured in a reality television programme.



### MOZILLA

Mozilla, through its Mozilla Learning Networks programs and in partnership with Souktel, is developing locally adaptable and scalable learning environments (“Mozilla Clubs”), as well as a free and openly-licensed curriculum to learn about the Web and smartphones. Mozilla is co-designing interventions with operator partners to effectively deliver digital skills training.



### TELECENTRE.ORG

In order to address the lack of opportunities for women to learn about and understand the internet and its potential, the Telecentre Women (TCW) programme provides tailored learning solutions for women through the global network of telecentres, including for mobile phone usage. Working with the International Telecommunications Union (ITU), Telecentre.org have developed a training package focussed on entrepreneurship training. So far, they have trained more than 1 million women in 79 countries.<sup>34</sup>

<sup>34</sup> More in GSMA Connected Women, “Accelerating Digital Literacy: Empowering women to use the mobile internet”



# Chapter 3: Experiments in mobile content creation

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The first decade of the World Wide Web was characterized by a chaotic and wide open platform, with a relatively clear separation between creators and consumers.<sup>35</sup> In its second decade, a generation of “Web 2.0” applications (blogs, wikis and social networks) emerged to form the participatory internet as we now know it. These innovations enabled a shift from **consumer cultures** (specialized in producing finished goods to be consumed passively) to **cultures of participation** (in which all people are provided with the means to participate actively in personally meaningful activities).<sup>36</sup>

Today we live in the era of the mobile internet. Thanks to web-enabled feature phones and low-cost smartphones, hundreds of millions of newcomers are experiencing the internet for the first time. At this moment, perhaps unique in history, most people’s knowledge, attitudes, and expectations toward digital life are still forming. Like Web 2.0 before it, the transition to smartphones may create the conditions for more inclusive and participatory mobile internet: an internet which is not only an efficient service delivery channel, but also a platform for digital economic development.

This will require providing tools that treat people as creators as well as consumers. And it will require innovations which enable broad, distributed participation in creating locally relevant content. Yet for the most part, today’s mobile internet is “read-only.” What, then, is keeping the mobile internet from being a truly “read-write” medium?

## 3.1 The mobile internet is not optimized for content creation

A smartphone is a device designed primarily for content consumption. There are ergonomic challenges related to authoring content on small touch screens. In contrast with PCs, which can accommodate users’ interest in production as they develop skills over time, mobile operating systems and input methods are designed to be simple and streamlined. As a result, the technology used to **create** rich content in emerging markets is less evenly distributed than the technology to **consume** it.

Mobile content such as media, apps, and services are distributed through much more restrictive channels than the early web, or Web 2.0. Without implied permission from the platform owner (i.e., Google Play or the App Store), it becomes very hard for producers to reach end users or to innovate in ways that run counter to the platform owners interests.<sup>37</sup> For these and other reasons, the mobile ecosystem is oriented toward professional developers and producers, at the expense of a broader set of content creators. These characteristics of the mobile Internet could handicap the wide-scale production of meaningful local content (and ultimately, as we have explored, the overall adoption of the mobile internet).

## 3.2 Identifying user-centred approaches to content creation: product design as a research method

Building on what was learned in early field research, the Mozilla Foundation product development team set off to design a new, general purpose content publishing platform that could enable creativity among first-time smartphone owners. The intent was to create a simple, streamlined content creation platform

<sup>35</sup> The World Wide Web was invented in 1989. As a result, the first decade of the web was the 1990s.

<sup>36</sup> Gerhard Fischer, [End-User Development and Meta-Design: Foundations for Cultures of Participation](#)

<sup>37</sup> This is a topic the GSMA covered in the 2014 report [Mobile Platform Wars](#)

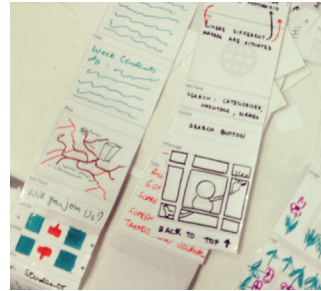
for low cost-smartphones—something like the 2015 equivalent of the early web page creation software “FrontPage”—while taking into consideration the lower literacy levels of the target market.

Here, product design was used as a research method. This contributed towards a greater understanding of the content creation opportunities in emerging markets, as well as the development of software to meet real user needs. **Webmaker** is the result—a tool tailored to empower ordinary mobile users as creators and content producers. It is free and open source, designed as a public interest application to stimulate further development in this area. Webmaker has been designed to be accessible to all kinds of users, especially new smartphone owners.<sup>38</sup>

One of the design goals of Webmaker is to create software that recreates the flexibility and low barriers to entry, characteristic of technologies like HTML and “home pages” of the early Web. Another was to ensure fluid sharing of this content; for instance, by providing URLs that can be shared through any communications medium, link directly to the content, and do not require membership in a social network or approval from a gatekeeper.

In designing Webmaker, the Mozilla team worked closely with volunteers and local users, taking insights into a tight, iterative feedback loop. In countries including Bangladesh, Brazil, Indonesia, and Kenya, Mozilla volunteers organised task forces, ranging from customer support to event facilitation, teaching, marketing and user research. Here, the “design charette” method was used, where potential users are involved in the design of the product itself. When describing how they would like the product to work, participants were relieved from any pressure that could be related to low digital confidence.

One example of this approach was to select participants to take part in informal workshops, provide them with paper, pens, and stickers, and asked them to design content and applications they would like to be able to create. These participants were also provided one very thin and unlimited piece of paper strip— representing the infinite scrolling of a smartphone screen—and a set of stickers, representing the building blocks we had envisioned for Webmaker (text, image, link, button, map).



With these constraints in mind, participants started creating their mobile apps, and we observed users’ content creation behaviours, from the ideation process to the presentation. Ideas for original content ranged from very light and fun, with projects such as **“How to know if your teachers are in the university”** to more common tropes such as **“Indian Food recipes”** as well as instructional content such as **“The road to get into a good college”** and social commentary like **“Social justice in Bangladesh.”**

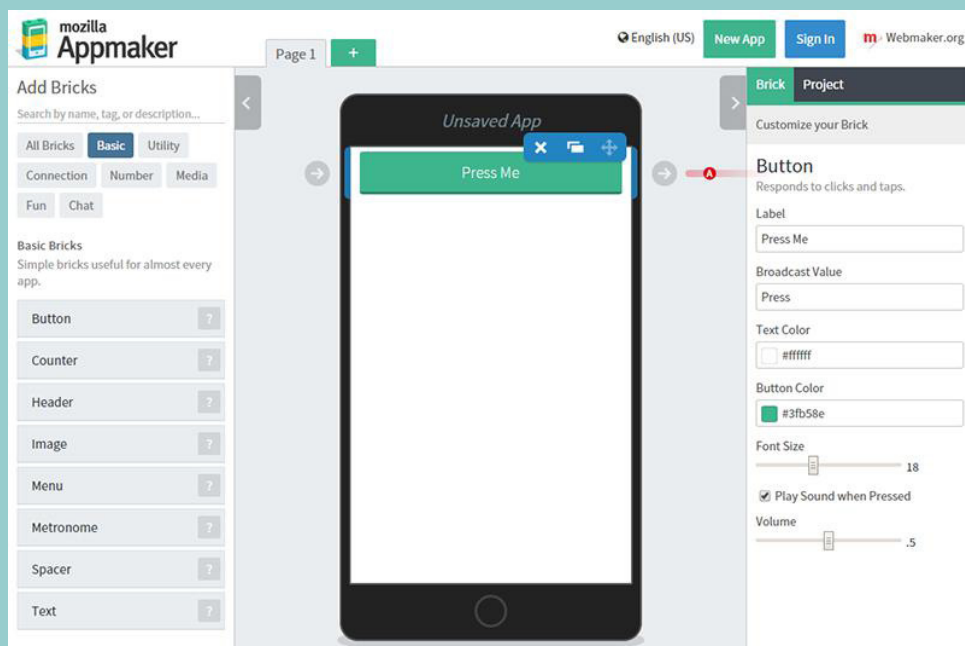
We used these insights to refine our content creation software, making it more responsive to user needs. In one year, over 20 software prototypes were created, which were live-tested and informed by hundreds of users in the field. This enabled our test users to be immersed in an experience closer to reality. It also enabled the team to observe phenomena that would be hard to glean from an interview, such as user interactions, enablers and stumbling blocks in creating digital content.

<sup>38</sup> The application was developed in the open, with a transparent and collaborative process drawing on best practices in open source. The application was developed in the open, with a transparent and collaborative process drawing on best practices in open source. A fully commit history for the project can be found here: <https://github.com/mozilla/webmaker-android/commits/develop>. The Appendix for a design history of Webmaker, including prototyped and discarded concepts

### 3.3 Designing and testing Webmaker with users in Bangladesh, Cambodia, India, Kenya & Rwanda

#### PRE-DEVELOPMENT TESTING WITH DESKTOP-BASED TOOLS

Before beginning development on the Webmaker mobile software, we wanted to validate the premise that a typically skilled emerging market user would be motivated and capable of creating local content and apps. In this hypothesis, typical users would not be creating breakout hits or monetizable content, but rather niche, long-tail content.



Testing this involved the use of Appmaker, a proof-of-concept, desktop-based content creation tool by Mozilla.<sup>39</sup> In partnership with Souktel Mobile Solutions and local development implementers in Cambodia and Rwanda, youth were challenged to imagine and create mobile applications in a single afternoon. The results were encouraging—without any prior coding knowledge or advanced digital skills, participants created apps for early childhood literacy, rural nurses, to teach kids about animals with pictures and sounds, and to teach youth about local traffic laws.



<sup>39</sup> Appmaker is a browser-based tool that enables users with little or no technical knowledge to quickly create and publish mobile apps, by mixing and matching modular “bricks” of functionality like buttons, selectors, forms, text and images. The resulting apps can be published and shared to any mobile device through the web browser.

In Cambodia, the winning project was an educational app teaching children the alphabet and basic reading skills. In Rwanda, the winning app was a mobile health solution for hospital patients, which included reminders to take medicine and the ability to write reviews of Rwandan hospitals. The app is meant to make information about Rwandan hospitals readily available to both Rwandans and visitors, who may not know where to turn for healthcare.

This finding was encouraging in that it demonstrates that it's possible for youth to quickly become content creators, even in countries with very low smartphone penetration and relatively lower levels of digital literacy. In a hands-on peer learning environment, and aided by simple content creation tools, young people were able to learn by doing and create their own original content. At sufficient scale, use of tools like this could help fill out a long tail of content in emerging markets. However, it was clear that such tools would need to live on mobile phones, not desktops, to achieve maximum saturation and mindshare. Mobile content creation has the potential to be much more mainstream, and an entirely mobile workflow could appeal to a larger number of people, spreading virally through social networks. This is also important because for many people, mobile is their only device and means of production.

Having validated that mobile content creation would be possible on desktop computers for ordinary users in emerging markets, and with a better understanding of the types of content such users would like to create, the Mozilla Foundation product development team set off to develop a free and open source mobile application. One important measure of its suitability is whether it appeals to target users, and is therefore capable of growing an organic user base. Here, two key decisions were made:

1. In evaluating various opportunities to support different demographics in content creation, the Mozilla product design team ultimately focused on the youth demographic, who are the most eager to learn, to be enthusiastic about new technologies and who are the most likely to create and share content.
2. Compared to desktop based tools, the mobile form factor has technical and design constraints. The Mozilla Foundation product team also sought to ensure high performance on the greatest range of devices, including very low cost smartphones. This led the team to narrow the complexity down to the three building blocks of web content: image, text, and links.





## 3.3.2 Lessons from development of Webmaker

The experience of testing Webmaker in the target countries suggests that pushing tools and user education for young people to be creative in emerging markets, has the potential to create significant positive effects in user confidence, long tail content creation, and user initiative. Among a group of youth who participated in Webmaker field testing in Cambodia and Rwanda, the number of participants feeling “very confident” about using the web increased from 27% to 65% during the course of a month. Larger scale, live market trials of Webmaker and other tools are required to further validate the opportunities implied here (see sidebar for first-month launch data).

Through this process we learned many valuable lessons. Essential to all of them was the importance of following the central principle of good design: keeping the focus on the end user. Here are some observations related to mobile content creation in emerging markets:

- **There is a latent appetite to create content in emerging markets.** Research participants and user testers were hugely excited and enthusiastic about the idea of creating for the Internet. In contrast, similar testing showed that users in Europe and North America, were less enthusiastic and already sensitized to the concept of publishing for a wider audience.
- **Sharing is a powerful motivator for original content creation.** In some of our testing contexts, we have observed that the social incentives for “sharing” content provide the hook that leads a user to generate his or her own original content. For a young person to gain attention among friends and family who have shared or liked their content on Facebook can be motivating and rewarding.
- **Popular social media platforms are already offering micro-businesses their own virtual storefronts.** Initial prototypes of Webmaker assumed that enabling people to bring their micro-businesses online would be an attractive user proposition. However, user testing did not reveal significant demand for this kind of general purpose tool, notably because micro-businesses across the developing world are already managing their businesses using social applications such as WhatsApp, Instagram and Facebook.<sup>40</sup> Popular social platforms have natural advantages and critical mass, meaning that they are already serving many micro-businesses well at this stage. Rather than socializing and serving a specific digital commercial niche, Webmaker evolved into a more general content creation platform focusing on visual, hyperlinked content that is not possible to create with existing tools.
- **Designing for the “next billion” requires the same focus and respect for the user as designing for those already online.** Simply because some are new to the Web, or to content creation, does not mean that those creating platforms and applications should underrate their ability to handle and even enjoy complexity. The initial Webmaker prototype used a series of pre-designed templates that users would customize and edit. This required little effort from the user who simply had to edit the existing templates with their own content. However, testing revealed that users were quickly bored by the process, and that this authoring system was too simplistic to realise many of the users’ ideas.
- **Users do not want to create the same content as everyone else.** During workshops, participants continually broke free of our restrictions, escaping the templates and the grids they were provided with, to experiment with more open-ended and fun concepts. This resulted in a dramatic change within Webmaker’s design, meaning the adoption of more open-ended navigation, and allowing more branching content and ability for the user to “tinker” with the product. Ultimately, leaving room for self-expression and differentiation on the part of the user is crucial.

<sup>40</sup> For more on this phenomenon, see [The Emerging Global Web](#)







Projects by users today range from highly personal to extremely public. They range from quick, single-page jokes to rich political commentary and how-to guides with a dozen pages.

DOA SEBELUM MAKAN

DOA SETELAH MAKAN

DOA SEBELUM TIDUR

DOA BANGUN TIDUR

*Proklamasi*  
 Kami bangsa Indonesia dengan  
 ini menjelukan kemerdekaan. Semua  
 hak yang mengesakan di dunia ini  
 dan Indonesia & P.B. Indonesia  
 dengan siapa saja akan menjadi  
 satu bangsa yang berkeadilan.  
 Dideklarasikan pada tanggal 17-8-'45  
 di Jakarta


MERDEKAI!

**Doa Sesudah Makan**

الْحَمْدُ لِلَّهِ الَّذِي أَطْعَمَنَا وَسَقَانَا وَجَعَلَنَا مِنَ الْمُسْلِمِينَ

"Alhamdu lillahil-hadi ath-amanaa wa saqana waja' alanaa minal muslimiin"

Artinya :  
 Segala puji bagi Allah yang memberi kami  
 makan dan minum serta menjadikan kami  
 memeluk agama islam



## 4. Conclusion and recommendations

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The last decade has seen a massive expansion in internet access, largely through mobile. But in many countries, there are significant gaps in content and awareness. **We believe it is possible to harness the energy of mobile users themselves to create more content, services, and economic value for their societies.** If we don't, we risk a retreat from the latent opportunities of the mobile internet.

The first priority in these efforts must be to raise digital capabilities in societies where millions are being connected for the first time. There is no clear roadmap to accomplishing this. However, the growth of the consumer internet in the developed world over the last couple of decades has shown that **the deepest and longest-lasting impact can be achieved through the organic exchange of technology practices between users**—the kind of social learning described in this report. Practices that are not dependent on continuous public or donor funding stand a greater chance of effecting lasting change in user behaviour.

Unsurprisingly, our research suggests it is young users who are most likely to embrace and share new technology practices. This means that **the relative youth of developing economies can be leveraged not only to increase awareness of the mobile internet, but also to generate more local content and services.**

For these and other reasons, **investing in broad digital literacy at the youth level** is strongly recommended as both a short term measure to drive engagement with the internet (and therefore lead to increased data consumption), as well as an investment in the long-term health of the emerging digital ecosystems.

## Recommendations

### Mobile Network Operators

As the largest providers of connectivity in emerging markets, there are already numerous demands on mobile operators to participate in ecosystem development and digital inclusion activities. Our research, particularly in Bangladesh, suggests there is a commercial rationale for operators to get involved in digital skills training: skilled customers help grow the bottom line.

#### The business case for customer education

In the short term, specialized training and social marketing content could be deployed to increase familiarity with mobile internet services and ultimately increase mobile data consumption and average revenue per user (ARPU). Our finding that those given skills training were more engaged users and creators of the internet (who consumed 17% more data over the course of a month) is a tentative one. However, it nevertheless promising and warrants further study. It suggests ways in which the short-term return on digital skills investment could be tested.<sup>41</sup>

#### Layering digital literacy onto existing operational models

One of the key ways in which this could be realised is by layering digital literacy onto existing operational models. The mobile industry is already on-boarding customers through agent networks and other distribution points. To increase mobile internet adoption, we recommend experimentation with informal training programs and agent support resources that impart more general web skills at the point of transaction. The value of familiarising customers with digital services has already been demonstrated, particularly with respect to transactional services such as mobile top-up, mobile money, and digital financial services. There is good evidence that customers who transact at the point of registration are more likely to be future active customers and produce significantly higher mobile money ARPU.<sup>42</sup> In

<sup>41</sup> We are interested in exploring further. Please contact us at [mobileopportunity@mozilla.org](mailto:mobileopportunity@mozilla.org) if you are interested in collaborating in this area.  
<sup>42</sup> GSMA Mobile Money, *State of the Industry Report 2014*. Using data from an anonymised operator, customers who transacted at the point of registration were found to be 26% more likely to be active customers and produced 95% higher mobile money ARPU on average.

short, to maximize the value of every customer interaction, it pays to invest in training agents how to educate and increase their customers' skills.

### **The importance of partnerships**

However, it is clear that operators alone will not be able to resolve the shortfall in digital skills. Mainly, this is because operators do not necessarily have the skills or capacity to play this role. It is also because the benefits of a digitally literate population exist as a broader public good, rather than as a benefit to a particular operator. As a result, there is a clear need for action from those working in government and the development sector to ensure there is sufficient provision of training.

## Development organisations

Increasingly, digital skills will be central to livelihoods and economic development. Whether someone is a farmer, a student or a micro-business owner, the ability to access, navigate and participate via the internet will be an essential skill. As a result, international development organisations and private foundations must prioritize digital literacy as an enabler of development across sectors.

### **The coming shift in content**

The shift to smartphones among underserved populations represents an opportunity, but also a challenge to previously-established ways of thinking about technology and development. To date, many development information services have been “push” services. However, over the coming years individuals will have the ability to access a richer and wider range of content. Users will also have the ability to create and contribute their own content to development projects, even if this constitutes a post on social media. Over the next few years, content strategies must be shaped according to this simple but profound shift in users' relationship with technology.

### **Embedding digital literacy in development strategy**

Although frameworks for measuring digital skills are lacking, the level of digital capabilities in any one region could be considered an important part of the enabling environment. Staff, programme beneficiaries, and individuals within societies will all require various skills to interface with the digital world. This means that digital literacy must be embedded within, and across, investments and strategies. How to implement this consideration is outside the scope of this report. However, there are principles that can be followed when thinking about the best way to invest in digital capabilities. Key among these are that frontline trainings must be developed in ways that are applied and engage user interests, and that the longest-lasting impacts will be achieved by organic exchange of technology practices in everyday use.

### **Engaging partners in digitizing development information**

Finally, the development sector is sitting on a wealth of locally relevant information. Development organisations are digitizing as much of their data and content as possible, but scale and financing challenges limit their ability to do this work conventionally. We believe that development programme beneficiaries, themselves, could be engaged in contextualizing, remixing, packaging, distributing and sharing development information—for instance, equipping youth to create apps for sharing health information, as described in chapter 3.3.

## Application and service providers

### **The opportunity for local services**

Our research has confirmed that there is a latent appetite among users in emerging markets to create original content. Users in these markets have not yet been sensitized to the possibility of freely publishing to an audience wider than their friends or family. As a result, there is a real opportunity for those designing products, services and applications that enable users to do this. As might be expected, large social media platforms like Facebook have been the first movers here. However, there will clearly need to be services that fulfil different needs.

### The importance of user- centred design

Those creating such services for the “next billion” must keep focussed on the principles of user-centred design. While their needs and interests may be different, these users have a similar desire for self-expression, customised content and being challenged as users in developed markets.

## Final thoughts

Over the coming years, **it is essential that users in emerging markets are able to build and shape a web that is relevant to them.** This will require coordinated effort from the mobile industry, the development community, governments, innovators, and digital entrepreneurs worldwide. By prioritizing this common goal, we believe that campaigns and targeted programs could dramatically increase user-driven content creation, and therefore ensure the relevance of the web.

## About the authors

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### Organizations

Dnet

Mozilla Bangladesh

Mozilla India

Mozilla Kenya

Equity Group Foundation

ISDI Mumbai

NID Ahmedabad

Digital Opportunity Trust

DAI Inc.

EDC Inc.

### Mozilla Foundation

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Matthew Willse

Kate Hudson

Bobby Richter

Cecile Pompei

Sabrina Ng

Gavin Sharp

Pomax

Laura de Reynal



## Appendix I: further reading and resources

The mobile Internet will be shaped by economics, by competition in the marketplace between innovative products and services, and by consciously embedding specific values in its design. We have tried to approach our work here as both analysts and also R&D leaders. Our approach has been first, to understand the landscape, then to understand what opportunities exist for multi-sector collaboration to shape the landscape itself.

Much of the work described in this report is ongoing. We invite your participation in further research, development, pilots, experimentation and reporting: please write to [mobileopportunity@mozilla.org](mailto:mobileopportunity@mozilla.org). If you have questions or suggestions about this report, please write to [m4dimpact@gsma.com](mailto:m4dimpact@gsma.com).

The works contained in the report, from software to research findings and curricular resources, are freely offered as a starting point to addressing the issues around local content and digital skills in emerging markets. In order to advance digital literacy and content creation agendas, others are invited to build upon what has been presented here, through re-use, adaptation, and iteration.

### Reading

GSMA, [Accelerating Digital Literacy: Empowering women to use the mobile internet](#)

GSMA, [Mobile internet usage challenges in Asia — awareness, literacy and local content](#)

GSMA, [Local content, digital skills and international development](#)

Mozilla, [Webmaker User Research: Bangladesh](#)

Mozilla, [Webmaker User Research: Kenya](#)

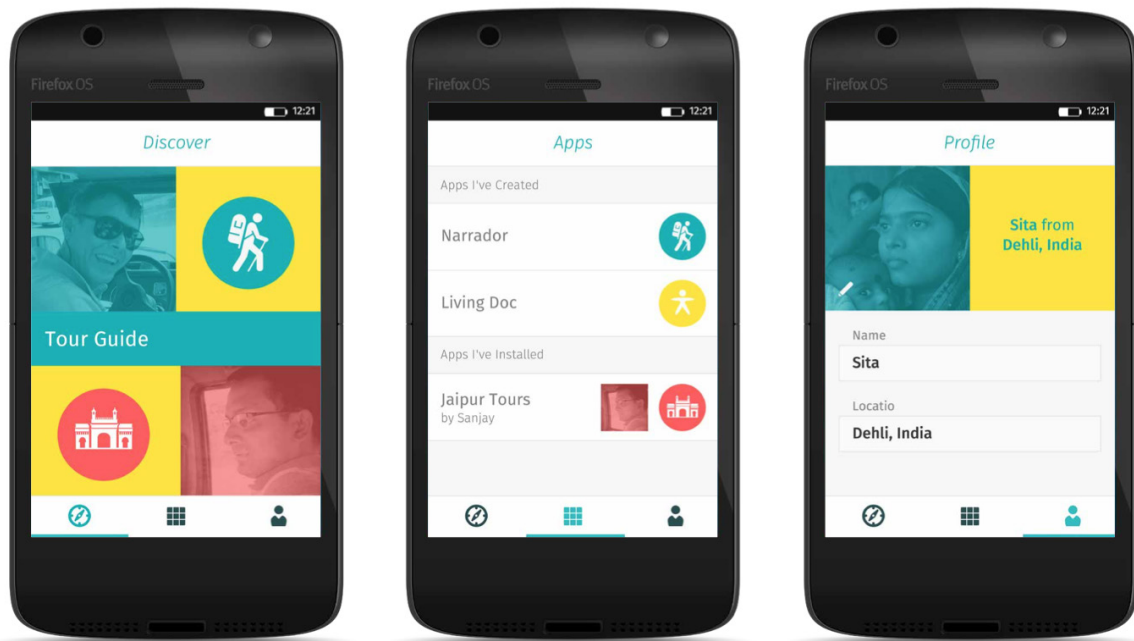
Mozilla, [Webmaker User Research: India](#)

### Source code

Webmaker for Android - <https://github.com/mozilla/webmaker-android>

Mozilla digital literacy curriculum - <https://mozilla.github.io/webmaker-curriculum/>

## Appendix II: The user experience evolution of Webmaker



### September 2014

#### Highlights:

- Template-based way of helping a user get started with building their first project
- Concept of having apps 'installed' within the product

#### Issues:

- Colour contrast between type and the background was too low for users with low-cost and older smartphones. Additionally, the headline font weight was too light to be legible on extremely low-end devices (<50 USD).
- While showing photos of the template's "authors" did humanize the app it also led to major problems in which a user would skip / dismiss the template as "not for them" if they did not identify with the author's photo. This was seen across gender, ethnic, and socio-economic signifiers.
- The distinction between an app being installed versus not installed was not clear



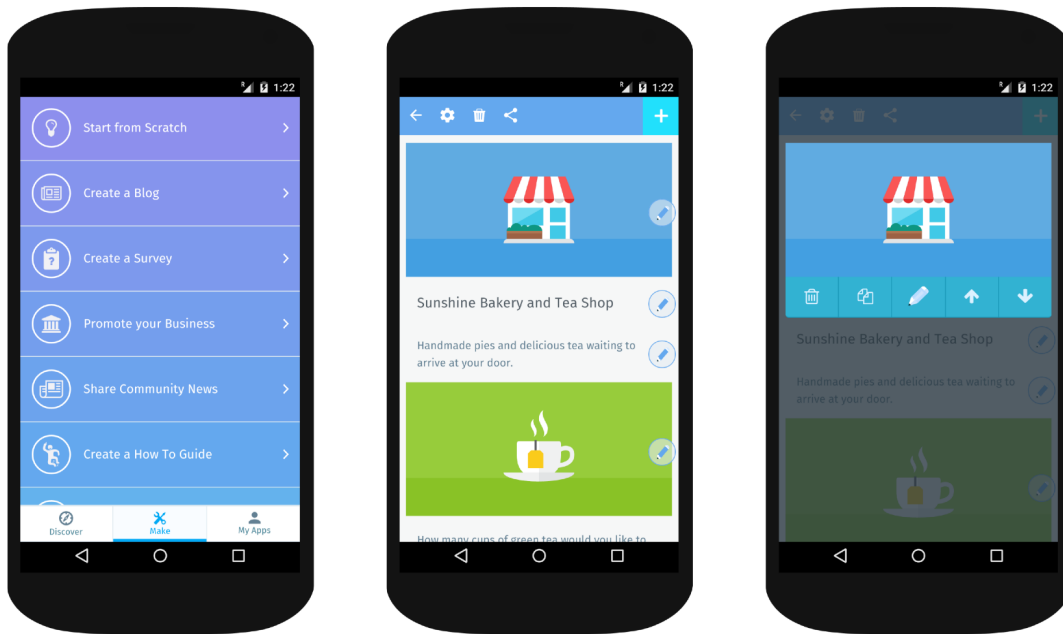
## November 2014

### Highlights:

- Redesigned template view to remove authors
- Added template preview as to allow users to evaluate the template before jumping into the creation (remix) process
- Added “Discover” gallery to show projects that had been created near (geo-location) the user or featured by moderators
- Added elements for data (form) creation

### Findings:

- Privacy and safety concerns with data features
- Template view reminded users of the Windows Phone interface (Lumia)
- Editing flow required too many steps and thus the creation process felt slow / limited



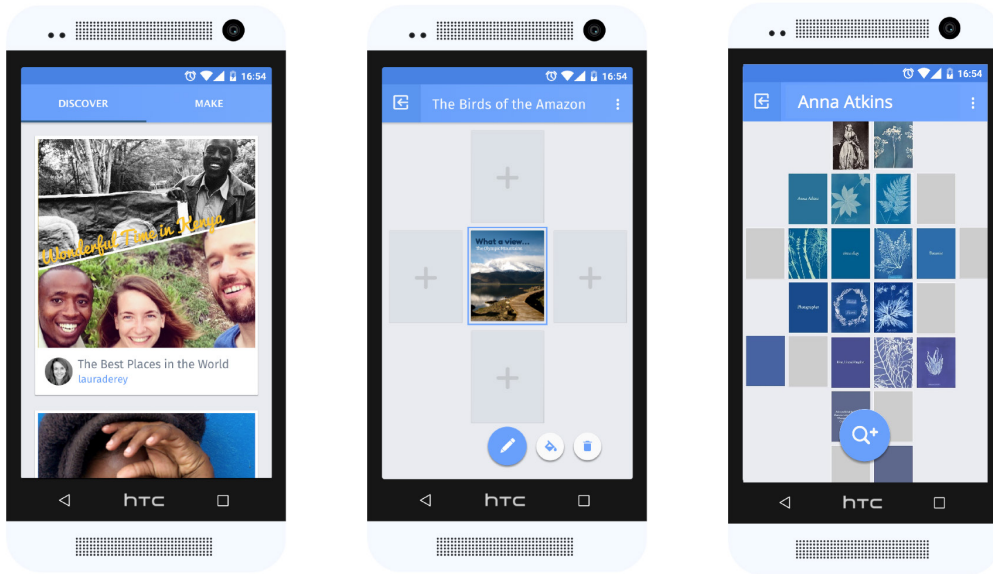
### March 2015

#### Highlights:

- Complete aesthetic redesign of the navigation to address negative associations to Windows Phone
- Updated editing flow to require less steps and less context changes to improve usability
- Improved sharing flow to allow users to share projects via SMS, Facebook, etc.

#### Findings:

- Not enough customization options for elements and projects led to lack of interest with younger users. The fundamental “list” paradigm was too constraining for the types of applications that many users aspired to create
- Use of a lower tab bar on Android devices felt awkward to some users as it was not conventional
- Not having project thumbnails in the “Discover” view lead to a poor quality discovery and search experience
- Templates were still too constraining / not useful as most users opted to use the “Start from Scratch” template



## June 2015

### Highlights:

- Complete redesign of the project / element system that allowed users to place elements anywhere they wanted on a “page” and then link those pages together.
- Added thumbnails to the discovery view
- Removal of templates feature

### Issues:

- New editing paradigm more flexible and fun but requiring a stronger on boarding / tutorial experience
- Strong user interest in additional media types like video and animated GIFs
- Still too many steps for a user to create their first project
- User research enabled us to design and refine Webmaker throughout the process. We tested a variety of interface options to make content creation as accessible as possible to the widest segment of users

## Appendix III: Web Literacy Basics curriculum

Working with Souktel Mobile Solutions, Mozilla developed a general curriculum to help first-time smartphone users understand the possibilities of the mobile internet.

In contrast with many of the digital skills training approaches popular today—which focus on teaching a user how to use specific apps—this curriculum was designed to help people develop understanding of higher-level abstractions, confidence, and mental models—i.e., “web literacy.” This curriculum takes the learners through a series of playful activities, which allows them to discover the potential of a smartphone.

This is a free and openly-licensed curriculum, which we will make available in English, Bengali, and other languages via Mozilla’s volunteer localization network. We encourage the adaptation and re-use of this content for any number of use cases, including delivery through mobile distribution channels, through the VAS channel or volunteer-led computer clubs. You can find this curriculum and many other freely licensed resources at <https://mozilla.github.io/webmaker-curriculum/>.

