GSMA Intelligence
Mobile for Development

ANALYSIS

Mobile platform wars

February 2014

Contents

About

GSMA Intelligence supports the digital empowerment of people in emerging markets through its Mobile for Development resource. It is a central platform of data, analysis and insight used to inform investment and design decisions for mobile services. Our work is freely accessible through support from Omidyar Network and in partnership with The MasterCard Foundation at gsmaintelligence.com/m4d

OMIDYAR NETWORK™

The MasterCard Foundation

Executive summary

A duopoly with a host of challengers

1. Mobile platforms have evolved into a duopoly, with Google and Apple the main beneficiaries

It is clear that Google and Apple have established a duopoly, now accounting for over 90% of smartphone sales worldwide. Google's business is the internet and data (it attracts almost 50% of unique web users and 65% of search queries worldwide), and Android is the main route to it in mobile. Android now accounts for around 80% of smartphone sales globally, with these mainly occupying the mid ($150-300) and low end range (sub $150). Apple's business is selling devices (the iPhone makes up around 50% of its revenue), and while its market share in smartphones is much lower than Android at 13%, this is in major part because it occupies the high end, with the iPhone price point remaining around $600 over successive versions of the device.

2. In developed markets, this will be difficult to change significantly given that smartphone penetration is advanced and the factors influencing platform success are largely self-reinforcing

That duopoly has largely been built in mature markets, namely the US, Western Europe and parts of Asia. While they have occupied different ranges of the handset price spectrum, their individual success can be traced to the key factors influencing platform reach: i) developer support to drive content availability, ii) lock-in mechanisms to drive cross-use of other services under their control (e.g. internet search, email, maps, music downloads), iii) distribution, marketing and, crucially, subsidy support from mobile operators, and iv) adoption by handset manufacturers.

Given the rapid adoption of smartphones over the last five years in these markets (penetration is now over 50% of the population), the competitive dynamic has already begun to shift from acquisition of new smartphone users to the retention of existing ones. The reality, however, is that this creep towards maturity in the developed world makes it more, rather than less, difficult for challengers to make a significant dent in the duopoly because the drivers of platform reach have (so far) proven to be self-reinforcing.

3. However, emerging markets represent the largest unrealised source of new mobile and internet subscribers. Given that smartphone penetration is nascent, the take-up and use of mobile data is rising, lock-in mechanisms have yet to kick in for incumbents and subsidies are less prevalent, these markets present more fertile ground for challenger platforms

Taking the world *as a whole*, the last five years would represent perhaps only the first chapter in a story of three – the remaining two to take shape over the course of the next five years with connecting the previously unconnected to the internet via mobile the main backdrop to this. Total mobile unique subscriber penetration is still less than 50% of the population in emerging markets on average (in contrast to the more commonly cited, but

often misleading, SIM card penetration of 90%). Smartphones are under 20% on this basis and unlikely to reach parity with feature phones in the *unique subscriber base* for 3-4 years. These markets will collectively add an additional 130 million new (i.e. incremental) unique mobile subscribers each year to 2018. Internet penetration is around a third but rising, with mobile the main gateway in the absence of widespread fixed broadband infrastructure (see Figure 1).

However, these markets have different dynamics: customers are mostly prepaid, handset subsidies are less prevalent, and the use of mobile data is rising despite smartphone penetration being low. There is also an added importance to customers of brand value and locally relevant content, so importing established content models from developed markets is unlikely to drive customer acquisition to mobile platforms. Finally, the value placed by consumers on services – particularly social networks – means there is less obvious value in associating with a platform itself, and more in its value in connecting those customers to the services they want. Facebook and its Internet.org joint initiative is a notable recognition of this. Platform owners are aware of this and are actively seeking to reach users by associating themselves with lower cost browsers, handsets (seeking to go sub $50) and by selectively partnering with mobile operators to offer lower cost access to the mobile internet. In the developing world, the platform wars have begun but it is early and incumbents are yet to become entrenched.

This mobile internet opportunity is the focal point for challengers. A concerted attempt from the Microsoft-Nokia pair is likely given Nokia's already large feature phone base that it envisages acting as an 'on ramp' to smartphones and more advanced services. Most interesting is the challenge brought about by a host of budding ecosystems attempting to use the web itself as their platform – Mozilla (with Firefox), Samsung (with Tizen), Canonical (with Ubuntu) and Jolla (with Sailfish). These all support HTML5, which has the advantages of strong developer support, open standards, the ubiquity of the internet and access to services. Several operators have recognised this and are in many cases positioning these as a low cost alternative to Android, expanding consumer choice.
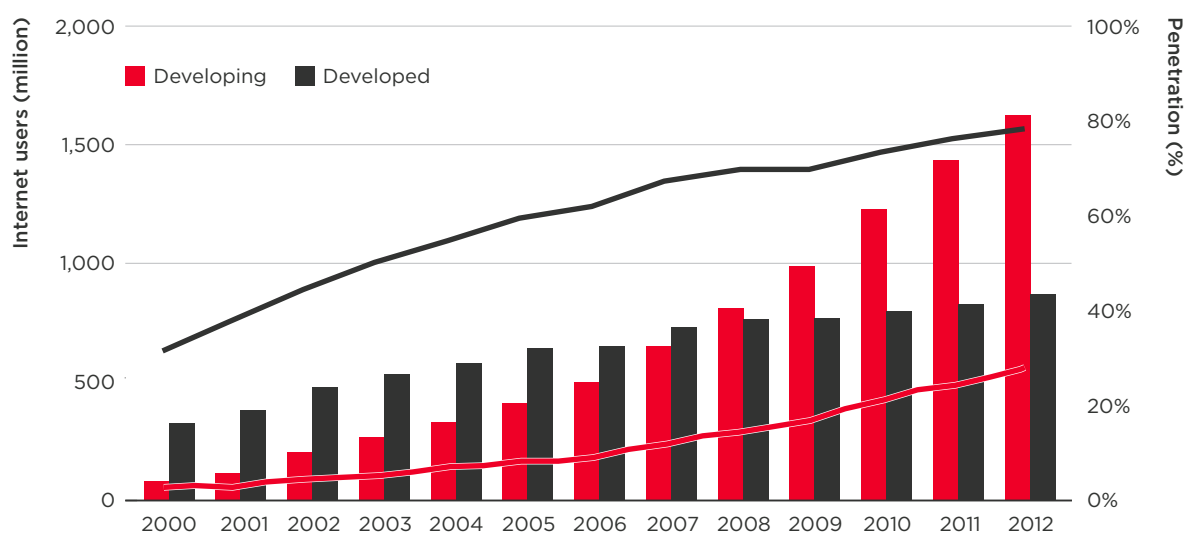
Figure 1: Internet users and penetration (population), 2000–12
Source: GSMA Intelligence, ITU

4. The potential for a successful challenge is less without concerted backing from mobile operators and handset vendors, and there is a time window for this

The success or failure of a challenger is a result not only of its quality and fit for a given market environment and consumer audience, but also its backing from outside parties. The nascent HTML5 platform has garnered perhaps the most vocal and public support from mobile operators, with much of this from early 2013. Split between Firefox, Tizen, Ubuntu and Sailfish, 36 operators have pledged their support through distribution deals or through participation in advisory groups, but as of December 2013 only 5 handsets had been launched. If the minimum market share needed for platform sustainability is around 5% and that challengers often do not have the luxury of cross-subsidising development from more profitable services (such that Apple and Google do through their core business), support must be concerted and swift.

Once a tipping point is passed, it becomes very difficult to change the balance of power from a monopoly or duopoly, short of true disruption. In the PC era, the failed challenge from Linux to Microsoft had a window of perhaps 4-7 years. However, in mobile it is arguably shorter due to the higher pace of device adoption, meaning any challengers would need to establish this minimum share in the next 1-2 years to have a chance of being a long term competitor.

A key consideration for the mobile operators in this is the route to market. More specifically, confidence among handset procurement officers that devices acquired will actually make it into the hands of end consumers. For countries where most smartphones are shipped through the mobile operator channel ('consolidated' distribution markets), the operators command more influence in the devices acquired by consumers than in countries where others (e.g. specialist retailers, supermarkets, independents) command the majority of shipments ('fragmented' markets). Our analysis suggests a key regional difference in this context, with 'consolidated' emerging countries (GDP per capita below $12,615) in East Asia and Latin America forecast to account for 43% of smartphone sales over the four years from 2014-2017. By contrast, countries in Africa and South Asia – for example India – are generally more 'fragmented' and as such operators have less influence indistribution, making challengers more reliant on mass market advertising and network effects. This underlines the importance for challenger platforms and the operators supporting them of first gaining scale and traction at the regional level before further expansion, as opposed to a scatter gun approach. Relatively low penetration but fast growing smartphone markets – for example China, Indonesia, Thailand, Vietnam, Philippines, Brazil, Mexico and Colombia – are among the high potential countries for this.

The last five years: rise of platforms

"Every once in a while, a revolutionary product comes along that changes everything... An iPod, a phone, and an Internet communicator. An iPod, a phone ... are you getting it? These are not three separate devices, this is one device, and we are calling it iPhone. Today, Apple is going to reinvent the phone"

—Steve Jobs
*January 9th, 2007 at the Macworld conference*

With this address and subsequent launch of the original iPhone in June 2007, Steve Jobs hence ushered in what in retrospect has become a new technological cycle in computing. The product was by no means the first smartphone (Blackberry and Nokia had plied their trade in this category for years), but it was the first to meet what an average consumer may regard as a phone that was smart, intuitive and easy. This is borne out in the evolution of device sales; up to 2008, smartphone sales proceeded upwards, but at no greater a rate than their erstwhile computing parent, the PC. However, 2009 marked an inflection point, which has since laid in train an inexorable rise. Despite preserving some unique functionality and use cases, therefore negating full substitution, PC sales have plateaued due to their longer replacement cycle, and are now outsold by smartphones 2:1 worldwide, a stunning reversal over a 5 year period (see Figure 2).
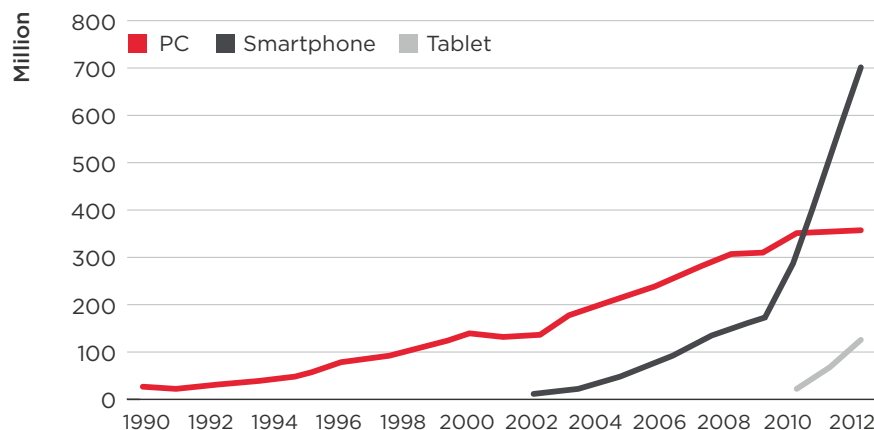
Figure 2: Annual worldwide device sales, 1990–2012
Source: GSMA Intelligence, Gartner, Strategy Analytics

As with previous technological disruptions, this period has been marked by a clamouring of participants seeking to extract value from a new market, some by choice and some by necessity. In Darwinian fashion, products that fail to meet consumer demand or fail to price appropriately have been slowly phased out in favour of those that do. Nokia (and its Symbian smartphone platform) is perhaps most notable, having been a pioneer in mobile phones for much of the 1990s and 2000s, before entering a disastrous cycle of failing to adapt, perpetuating further market share decline, with this ultimately resulting in its handset business being engulfed (see Why emerging markets hold the key to success for Microsoft-Nokia). Android has been the prime beneficiary, having been announced in 2007 and since having gone on to account for well over half of smartphone sales worldwide (see Figure 3). Apple, meanwhile, has maintained a steady ship, leveraging its skill in product design and user experience with a finely honed marketing machine, attracting a following that rarely defects.
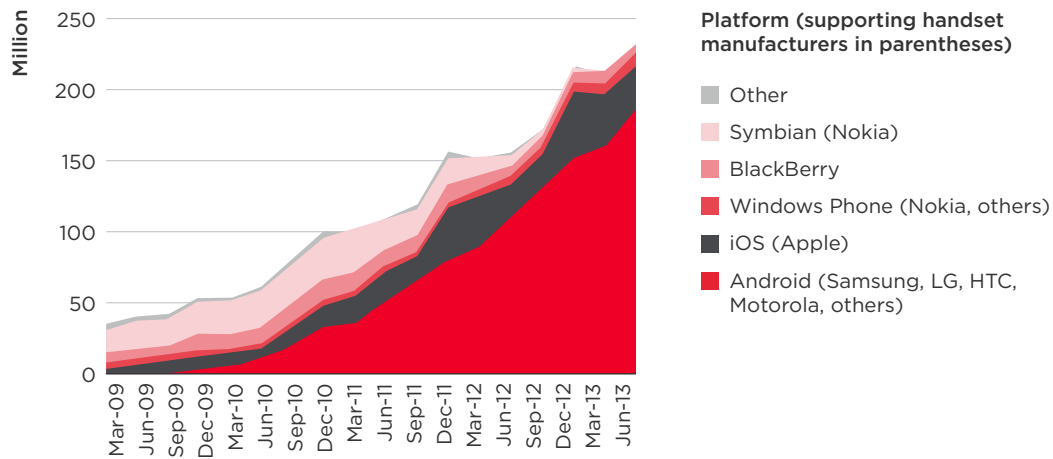
Figure 3: Mobile platform share evolution (smartphone sales), 2009–13
Source: Source: Strategy Analytics

Fast-forward to 2014, and we now live in a mobile communications world characterised by ecosystems, drawing closer participants at multiple levels of the value chain. While separate things, software, hardware and the internet have experienced a coalescence in the minds of consumers because they are regarded not as technologies, but contributing elements to a seamless experience. Where once mobile and internet firms did not often cross paths, their relative successes are now much more intertwined, predicating the continued need to extract comparative advantage but also to form strategic partnerships. This has been at the root of much recent innovation and competition in mobile computing in mature markets across Europe, the US and parts of Asia (notably South Korea and Japan), where smartphones now account for over half of handset sales and continue to rise.

The open vs. closed conundrum… Google and Apple success with different approaches

At the most fundamental level, a platform consists of a core technology or service, a range of modules or components that integrate with that core, and the interfaces in-between[1]. For the most part, the core is stable, with the components variable over time based on changing technology and consumer demand. By opening a core technology so that it can be built on by other firms, the platform owner enables external innovation that can help to create value around the platform itself. In mobile, it is this external innovation that is behind the rise of ecosystems over the last five years, with the platform at the centre of multiple parties utilising and transacting over it. Principally, four key groups have emerged around the platform: consumers, developers and content providers, mobile operators and device makers.

In essence each platform can be viewed as a micro-economy with the centre of gravity between consumer-led consumption, and the supply of apps and content by developers and other service providers. Two-sided markets always face the chicken-and-egg problem of not having enough value on one side of the equation to attract the other side. For platform owners, the challenge is to design the platform structure and rules in a way that

---

[1] While there are many definitions, interpretations and use cases of a platform, for the purposes of this report we define as above and include the main organisations behind platforms used on smartphones and, in some cases, feature phones (we do not focus discussion on tablets), with others such as social networks and e-commerce treated as adjacent.

attracts all necessary user groups to participate in the market. This typically means that the platform owner needs to subsidise or somehow incentivise one side of the market to participate, in order to attract the other side (which it then tries to monetise). Apple charges developers (30% commission on apps/content in App Store) and allows end-users to access the store for free, while Google and Microsoft have adopted similar approaches (eBay works in a similar way in e-commerce, allowing consumers to use the service for free while charging the sellers for listing, subscription, and other fees).

This reliance on external innovation forces platform owners to answer the critical question: how open should the platform be? Typically, platform owners maintain key intellectual property assets that allow them to extract an acceptable share of the profits from the platform ecosystem. However, the platform owner must balance the profit motive with the need to attract complementary firms which can also benefit from the platform (and therefore are incentivised to participate).

The constant tension between what to make open and available (e.g. source code, APIs[2], SDKs[3]) and what to keep proprietary and closed goes to the core of the strategy for monetising the platform. Google has pursued a strategy of relative openness with Android, attracting developers with a large audience reach, a proprietary app store (Google Play) and a relatively clean, standardised development environment. Google's business model is based on digital advertising, so it has never needed to monetise Android directly given that it is a channel to its core business on mobile. By contrast, Apple's integrated platform of hardware, operating system, and app store has remained essentially closed and tightly controlled, with lower reach but a higher-end customer base, enabling developers and content suppliers to more easily monetise their products and services. Microsoft, BlackBerry and Symbian (Nokia's flagship smartphone platform that is being retired as it transitions to Windows Phone) have been squeezed in between (see Figure 4).
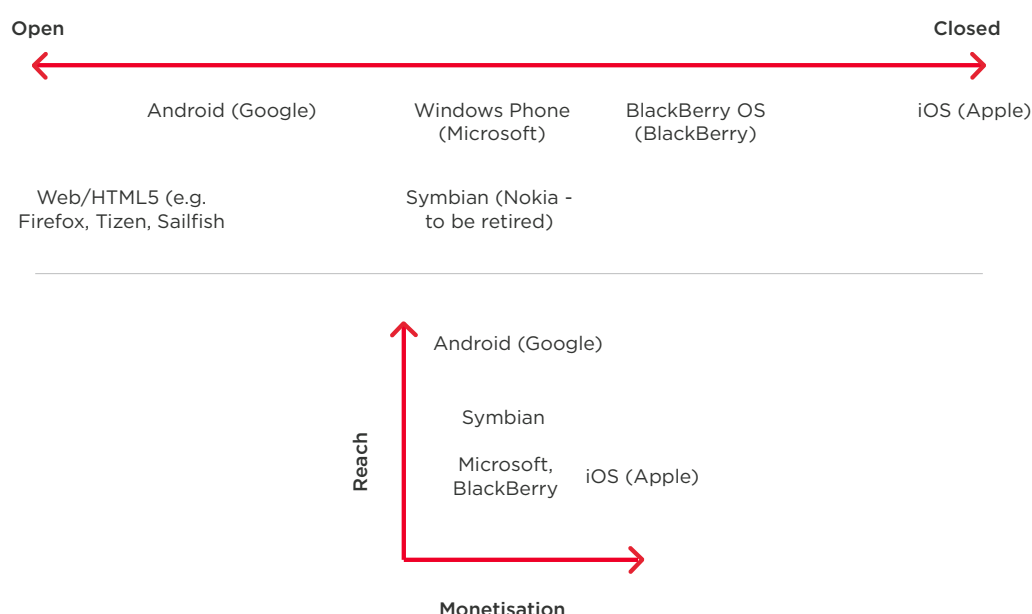
Figure 4: Spectrum of platform openness, and reach vs. monetisation potential
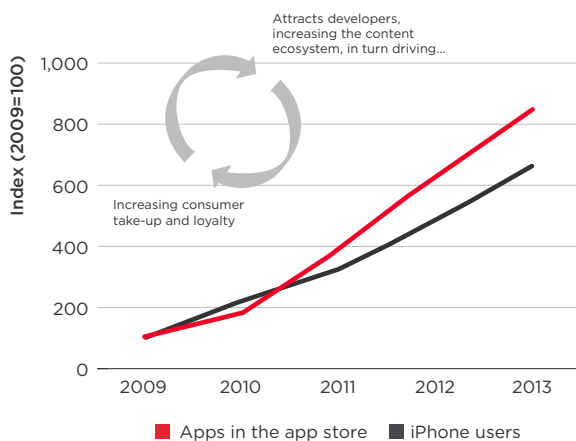*Source: GSMA Intelligence*

[2] Application programming interface
[3] Software development kit

With some exceptions, the entrance of internet players into the mobile space happened because the playing field their business models operated on changed from the fixed line/PC era to mobile. From a commercial perspective, platforms are the means of competing on their core business models in a mobile world. The goal is therefore to achieve network effects, where a consumer audience attracts developers and service providers, in turn attracting more consumers through a virtuous circle. This is particularly evident in the evolution of Apple's iOS platform, with the rise in users and content almost in lock step (see Figure 5). In a different way, it can also be seen for Android. Google has relied less on making money directly from Android (the licence to use it is free and most developers are attracted by its reach, not its monetisation potential), and more by it acting as a gateway to Google's core internet business, where it enjoys a majority share in search advertising (see Figure 6).

**Figure 5:** iOS positive network effects
Source: GSMA Intelligence
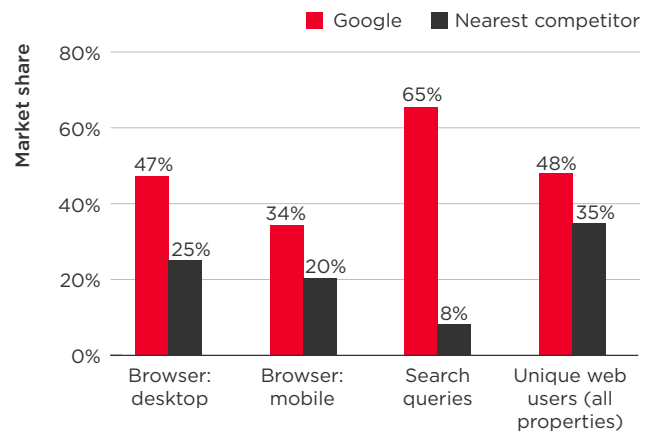
Figure 6: Internet market share:
Google vs. nearest competitor
Source: comScore, StatsCounter, GSMA Intelligence

As a result, these two platforms now account for 90% of smartphone sales worldwide and over 80% of developer mindshare, with this having been reinforced through operator subsidies and, in the case of Android, the backing of multiple handset manufacturers (see Figure 7).
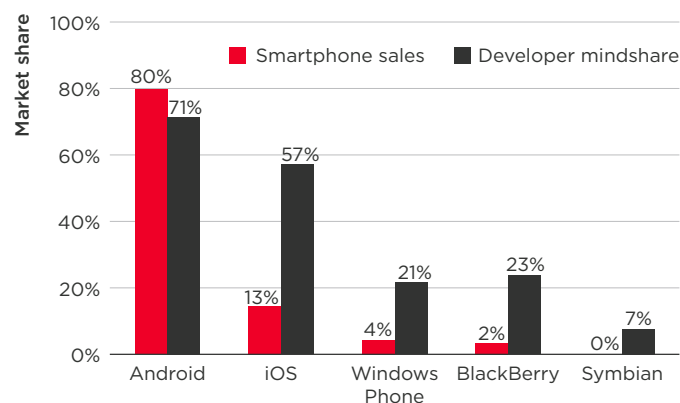
Figure 7: Android and iOS control
Source: Developer Economics report (Vision Mobile), Strategy Analytics, GSMA Intelligence

(Note: sales figures are for the quarter to June 2013, developer figures for July 2013)

The next five years

Looking ahead to the next five years, there are three high level scenarios, taking Android as the starting point given its current dominant position:

1. Android maintains or increases market share, but with more fragmentation (in the number of handset manufacturers using it, the version of the operating system, and in the user experience)
2. Android maintains or increases market share, but with more consolidation
3. Android loses market share

While it is tempting to make predictions on a firm outcome, it is not our intention to do so. We believe it is more useful to assess the influencing factors behind these potential scenarios (particularly on the prospects for challenger platforms), and the implications for the wider mobile sector. It is easy to simply extrapolate the current picture into the future, inevitably leading to the conclusion that Android and iOS – and by extension Google and Apple– have already 'won'. However, even if, say, Android goes on to maintain its share position, what does that actually mean for Google (and the mobile operators), particularly if that share is widely dispersed amongst the handset manufacturers that use it, in the version of the operating system, and in the countries where it is used?

We first explore the emerging markets environment – where smartphone penetration is relatively low but rising – to understand why the playing field is different and what implications this holds for platform owners and mobile operators.

Following this, we analyse the prospects for selected challenger platforms over the next five years, taking into account their value proposition and challenges, and the implications for the mobile sector.

Emerging markets context — paradigm shift?

The platform wars have so far mainly been a developed world game. Across the US, Europe and advanced Asian countries, smartphone penetration is now over 50%, with this continuing to rise inexorably alongside the transition from voice to data-centric communications, still heavy operator subsidies and lock-in mechanisms employed by platform owners. While that same trend towards data is also underway in emerging markets, smartphone penetration is much more nascent, with these devices firmly in the minority despite price declines. As a share of handset sales, smartphones are now over 40% in emerging markets compared to under 10% in 2008, but the implication of this can be misleading. Sales take time to distil down into the actual human user base due to the handset replacement cycle (1-3 years). Second, they fail to capture the vast number of handsets across the developing world acquired through the second hand (or even hand-me-down) market. The actual human user base is a more indicative measure of the devices currently in circulation and therefore the range of functionality that consumers have at their disposal. While smartphone sales are expected to surpass feature phone sales in 2014 on average across the developing world, they will not reach parity in the number of people that actually own them for several years to come (see Figure 8).
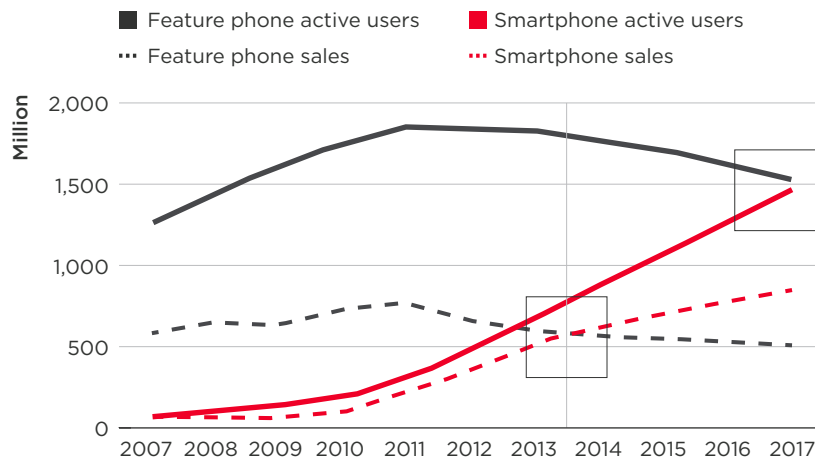
Figure 8: In emerging markets, parity in the handset user base is still a way off
Source: GSMA Intelligence, Strategy Analytics

However, this is not to deter consumers from accessing mobile data and the mobile internet. While the range of functionality, quality of the user interface, range of apps and route to a content ecosystem are enhanced on smartphones, feature phones have advanced in their own functionality in recent years, notably in the data experience. As a result, mobile data penetration is well ahead of smartphone penetration, underlining the latent demand for access to the mobile internet (see Figure 9).
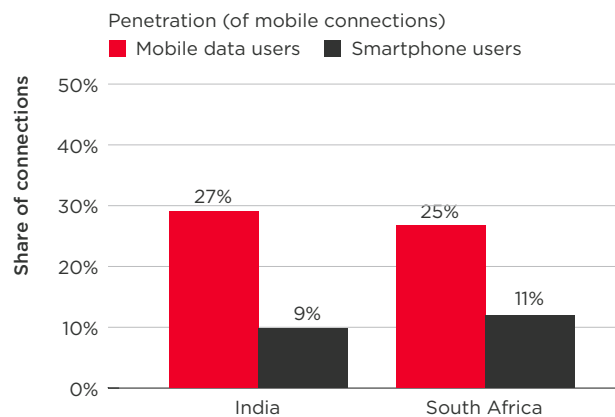
**Figure 9:** The mobile internet does not require smartphones
Source: Vodafone (India) and Vodacom (South Africa), GSMA Intelligence

(Note: figures are for September 2013, India smartphones June 2013)

At the technological level, this is due to improvements in data compression technology from mobile browsers (such as Opera Mini), lessening the drain on the processing power of feature phone handsets by shifting back-end tasks to the cloud, and improvements in the coverage and capacity of mobile networks on 2G and 3G through investment and, increasingly, tower sharing (4G is slowly growing, but from a nascent 0.2% of connections across the developing world compared to 17% in mature markets). Facebook and its Internet.org campaign is a recognition of this, bringing together technology players among others (such as Ericsson, Samsung and Mediatek) to further reduce these barriers to mobile internet access. Mobile operators have also made significant efforts to align data tariffs with the economic realities of their predominantly prepaid and mid to low income customer bases. A raft of flexi options are now available that, for example, allow customers to use the internet for a given amount of time (e.g. 12 hours within a 4 week period), or even for access to a specific web property, notably Facebook and Twitter given the affinity for social networks (see Tailoring mobile internet tariffs for prepaid users – a balancing act).

Mobile data use is also increasing among customers accessing Value Added Services (VAS) geared towards socio-economic development. While SMS has for years been the preferred technology in this space (notably in mobile money), the increase in the use of apps or the mobile internet over the last 2 years is notable, particularly in health, education and the emerging employment and small business applications (see Figure 10). Some of this is happening on smartphone platforms – mainly low cost Android – but we believe the majority is on feature phones, with Nokia and Samsung among the key players.

It is also important to consider some of the more subtle aspects of customers in emerging markets, which have implications for the positioning of mobile platforms.
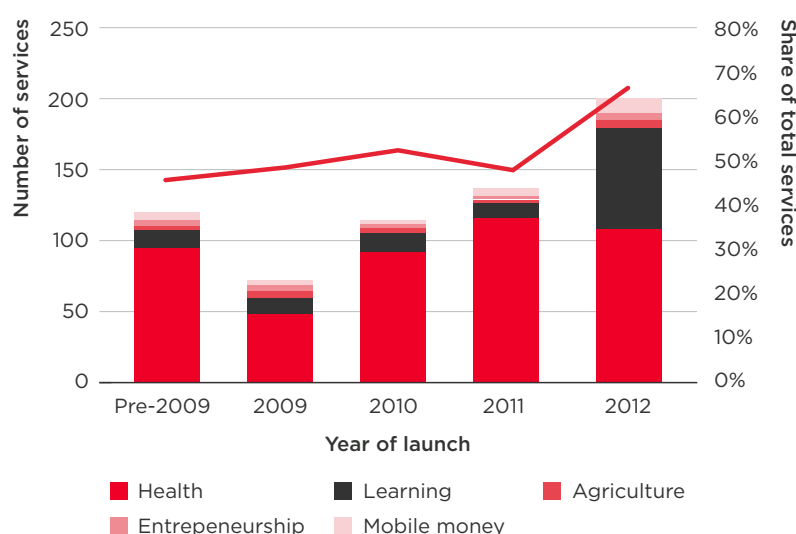
Figure 10: VAS making use of mobile data

Source: GSMA Intelligence, Mobile for Development

(Note: services will often be offered using more than one technology (e.g. SMS and the mobile internet) so as to avoid excluding people on the basis of the mobile device they have access to)

Devices and subsidies

While it is hard to argue smartphone penetration would not have become mass market in developed countries in the absence of operator subsidies, they have sped the pace at which this occurred (lower up-front prices for handsets, with the full cost spread over an 18 or 24 month contract, increases customers' willingness to purchase new devices). However, the financial impact is difficult to ignore, with subsidies now being cut back or even abolished in some markets. In emerging markets, subsidies are largely absent given the mostly prepaid customer base and, in many cases, lack of credit worthiness or even proof of identity. Taking Asia, Africa and Latin America combined, they account for around 70% of handset sales volume worldwide but only 20% of the subsidy value.

However, the value placed on owning a mobile phone among even very low income populations is striking (for example, in South Africa two thirds people in households earning under $3 per day own or have access to a mobile[4]) – indeed, the mobile phone is perceived as being more of a necessity than a luxury. However, the cost of this ownership is relatively high as a proportion of income. This places importance on lower cost handsets (moving to sub $50) and innovative handset acquisition options.

Relevance of local content

The internet is global, but content consumption is local. The vast majority of user-generated content has so far come from North America and Europe (see Figure 11), mainly as a result of those markets also having the highest internet penetration. But the rising use of mobile data, specifically with social media, in emerging markets suggests a latent demand for localised content that takes account of language, dialect and culture.

User-generated content per 1,000 people
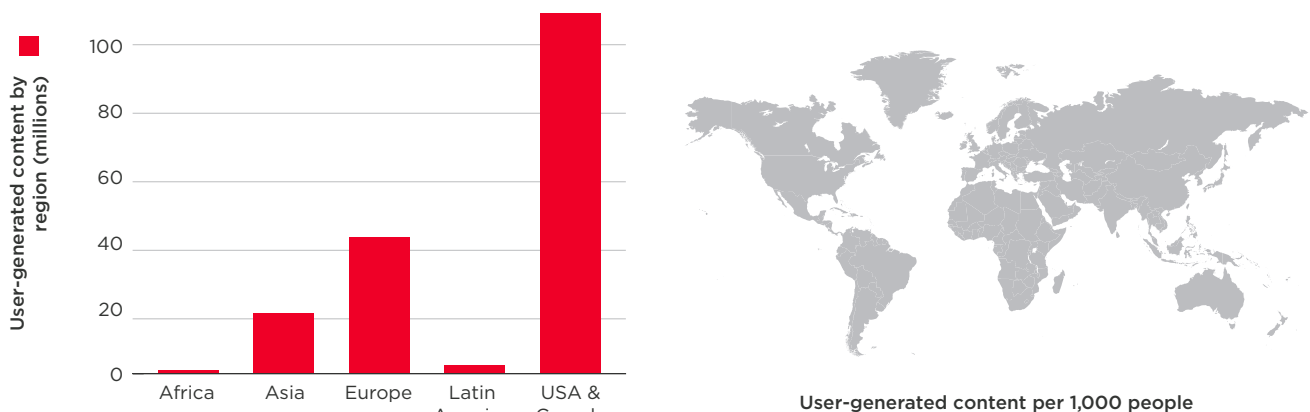
Figure 11: Where does Google-indexed user generated content come from?
Source: Convoco, Matthew Zook, 2009[5]

---

[4] GSMA Intelligence calculation based on data from South African Audience Research Foundation
[5] User Generated Content in Google, Oxford Internet Institute, June 2011

This is reflected by the mobile operators. The GSMA's Digital Inclusion initiative has surveyed operator groups on the barriers to the take-up of mobile data in Africa, Asia and Latin America, with initial feedback aggregated among 23 operators suggesting the availability of local content is among the highest along with the total cost of access and literacy. This raises an obvious challenge around fragmentation. Countries with large populations, multiple languages and ethnic affiliations can create niche markets that lie outside of mass market appeal, reducing the incentive for app and content developers to innovate. Both mobile operators and internet players must be mindful of this, balancing the aim of scale with the need to tailor content to local customers.

Digital commerce

The proposition for internet players in emerging markets is different than what has propelled their success in developed economies. An advertising-dependent business model is not (at least initially) going to have the same strength in predominately low-income markets. Until the majority of customers in these markets have the ability to participate in a digital economy, the gain of "market share" in terms of the largest number of users is less meaningful. All the major players can make their play to get the next billion on their platform but if that billion has no means of transaction once they are there – what has been gained?

In the midst of these platform providers defining their strategy and vying for their place in the market are the mobile operators, who have a very different business model. Even more than the relationship operators have with customers in mature markets, in emerging markets operators tend to enjoy very strong brand recognition with positive association and often own more insights and information on the customers in this market than any other service provider. Operators also hold a crucial advantage in their relationship with local governments. While internet players are global by definition, looking to provide platforms that transcend national boarders and access to information without requirement to check identity or citizenship, operators require a very different approach. They are necessarily working with the local governments when it comes to spectrum allocation, licensing, and regulation being applied to myriad aspects of their business including what they know about their customers and potentially financial regulation for mobile money products and services.

All members of the ecosystem in this space benefit from and want to see the growth of a flourishing digital economy that allows customers of all types (including prepaid customers who may not have bank accounts) to participate in and transact. For the first-movers in this space there is somewhat of a dilemma. On the one hand, any investment and risk taken on to create products that provide a pathway for these consumers to a digital economy is done so with the intent of gaining more loyal customers and increasing market share. However, the nature of how digital economies work is by achieving as close to a seamless transition from one platform to another and being able to easily transact from the same "wallet" wherever you go. If this vision is to be achieved then innovators in this space need to prioritise open, collaborative solutions that allow for interoperability across multiple platforms. The short-term play would be to create more closed products that lock a customer into one service; however, these gains are likely to be short lived in what is becoming a more popular and crowded space. The more interoperable any solution is built, the more robust the participation will be across various members of the ecosystem.

What is clear here is that in addition to the strategic approach adopted by internet players and platform providers geared towards succeeding on handsets, price points, usability, local content and apps, they also need to think about who is going to be supporting the infrastructure needed for digital wallets. This, first and foremost, requires relationships with regulators and policies compliant with local laws in all markets. Working with operators to benefit from where they have been doing the ground work in this regard will be key to building these digital economies.

Taking all of these considerations – devices, content, commerce – together is reflective that the rules of engagement for connecting the average customer to the internet in emerging markets are different to those of the developed world experience over the last 5-10 years. Foremost, while smartphone penetration continues to rise (and faster in particular regions), it will take time for the majority to be in a financial position to upgrade to smartphones (even with continued price declines). However, a large proportion will engage with data services and the mobile internet on feature phones before making the handset transition, underlining the value of reaching a feature phone customer now as an important long term investment.

A wave of challengers – potential?

Despite the strong positions held by Google and Apple in the mobile platforms space, there are a range of challengers. We examine the prospects and implications for these on the basis of their establishment, starting with Windows Phone and Nokia, and then the new cadre of budding web-based HTML5 ecosystems including Mozilla, Tizen, Sailfish and Ubuntu.

Windows Phone

Microsoft has for years attempted to establish a foothold in the mobile space, but has largely been unsuccessful in this regard through a number of platform iterations. Its Windows Phone platform still takes under 10% of smartphone sales globally despite vast sums having been spent in marketing and promotion over the last 5-7 years. Nokia, of course, has been the main adopter of its smartphone platform (from 2011 having staked its own future on it). Microsoft's purchase of Nokia's Devices and Services business in 2013 was strategically important, but also one of pragmatic convenience.

There remain significant headwinds to its success in mature markets, largely because it is competing on the same model as the incumbents (Apple and Google) where smartphones have already reached the mass market. However, it appears to be playing as much for the opportunity in emerging markets. Nokia already controls a large installed base of feature phone users, playing to its assets of durability, strong battery life, low cost and a suite of services that help reduce customer churn, particularly among mid and low income segments (see Figure 12). While the Windows platform presence is still very low (below Android, iOS and BlackBerry), its strategy is to grow this by using the Nokia feature phone base – particularly those running Asha – as an 'on ramp' to smartphones over time (see Why emerging markets hold the key to success for Microsoft-Nokia).
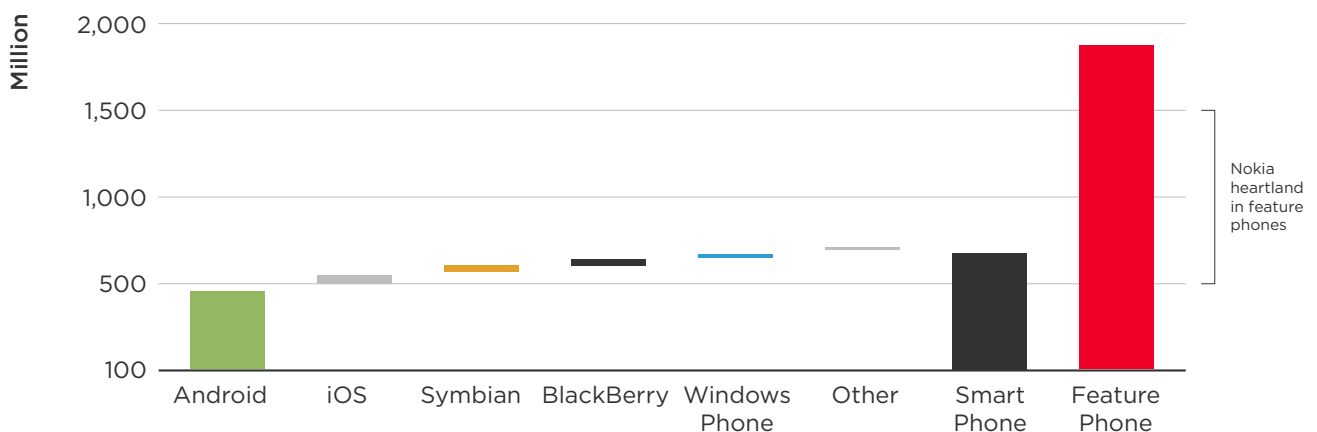
Figure 12: Active handset users by platform across emerging markets (2013)
Source: GSMA Intelligence, Strategy Analytics

In many ways, Microsoft has been tipped as the next viable ecosystem before. While its mindshare among app developers is low relative to Android and iOS, it does much better among those intending to use it, suggesting a core of developers seeking to expand their audience to a different customer base and in new countries (see Figure 13). However, it has consistently been among the highest intention platforms, but has not yet converted those intentions into action. Perhaps more than any other mobile platform, Microsoft underlines the chicken and egg problem of developers wanting a proven consumer audience, and consumers wanting a stable of apps – the risk, of course, being that neither happen. We believe there is genuine potential to increase the reach of the Windows Phone platform in emerging and some mature markets (especially over the next 12-18 months) and with it the range of applications targeting both entertainment and core services (e.g. education, job searching, commerce), but this will require stronger developer support and backing from the mobile operators than has been present to date.
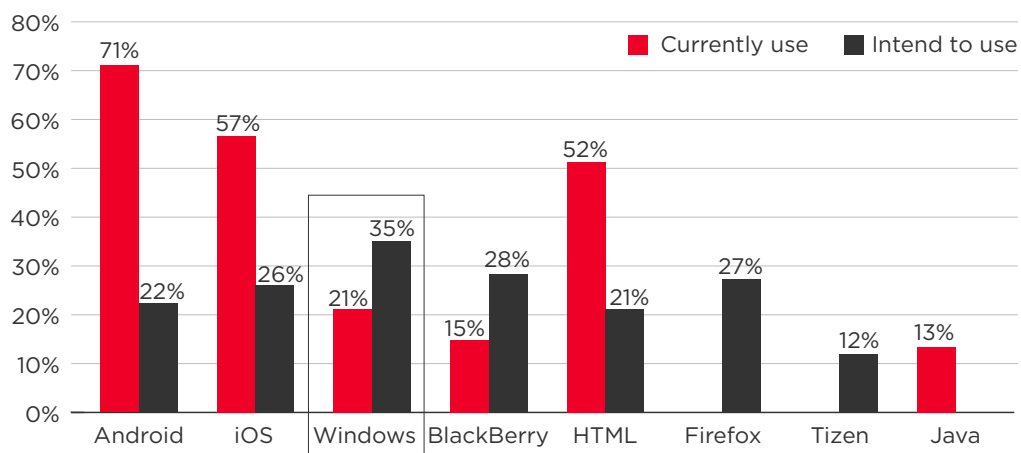
Figure 13: Which platforms are most popular with developers?
Source: Developer Economics report, *Vision Mobile, July 2013*

(Note: some figures for Firefox, Tizen and Java not available)

The web as a platform – Firefox OS, Tizen, Ubuntu and Sailfish

Perhaps the most interesting (and newest) play is that using the web itself as a platform. Mozilla (with Firefox OS), Samsung (with Tizen), Canonical (with Ubuntu) and Jolla (with Sailfish) have all entered the fray with a similar strategy of offering an open-source ecosystem intending to capitalise on already existing web standards for development, namely HTML5 (see Figure 14). Developing on handsets mostly at the mid and low end (e.g. below $150), they are attempting to capitalise on the next wave of mobile internet users and appealing to mobile operators seeking a low cost alternative to Android.

	Firefox	Tizen	Ubuntu	Sailfish
Parent	Mozilla Foundation	Consortium (led by Samsung)	Canonical	Jolla
Kernel	Linux	Linux	Linux	Linux
Available coding languages	HTML5, C++	HTML5, C/C++	HTML5, C/C++, QML	HTML5, QML
Accessibility	Open sourced	Open sourced	Open sourced	Open sourced
Mobile operator support	15*	6**	14 (Carrier Advisory Group)***	1
Handsets released	4 (ZTE Open – $90, Alcatel One Touch Fire – $130, LG Fireweb – $200, Geeksphone range - $120-200)	Handset launches planned for MWC 2014	Expected 2014	1 (Jolla Phone – $540)

Figure 14: Mobile ecosystems using the web as a platform

Source: Company websites

* América Móvil, China Unicom, Deutsche Telekom, Etisalat, KDDI, KT, MegaFon, SingTel, Smart, Sprint, Telecom Italia Group, Telefónica, Telenor, TMN, VimpelCom
** KT, LG U+, NTT Docomo, Orange, SK Telecom, Vodafone
*** Hutchison 3G, China Unicom, Deutsche Telekom, Everything Everywhere, KT, LG UPlus, MTN Group, Portugal Telecom, SK Telecom, Smartfren, T-Mobile, Telecom Italia, Telstra, Verizon Wireless

Mozilla (Firefox OS)

Leveraging its deep web and browser technology expertise, Mozilla has developed an open platform based entirely around open web standards, claiming "the web is the platform[6]."To this end, Firefox OS can run web apps written in HTML5 as native apps on the mobile phone, optimising system responsiveness and granting access to hardware functionality. The strategy is innovative—instead of trying to build up its own ecosystem of proprietary apps to rival the hundreds of millions of apps made for iOS and Android, Mozilla is taking advantage of existing developer support for web-based applications and content (see Figure 13).

For mobile operators, Firefox OS offers customisability (e.g. operators can easily integrate proprietary software) and a non-Android alternative for low-end and mid-range handsets. The former gives the operators options for brand differentiation and revenue generation, the latter gives them better leverage in pricing with Android handset OEMs. Mozilla has signed deals with a suite of operators (among them Telefonica, America Movil and Telenor, with a geographically strong presence in Latin America), who have a strong interest in expanding their portfolio of affordable, non-Android handsets. The first Firefox handsets were the Aclatel One Touch and ZTE Open (both under $150 without a contract), with these having been followed by the LG Fireweb and the Geeksphone range (from $120-200).

[6] Mozilla Firefox OS website

Tizen, Ubuntu and Sailfish

All three of these new platforms are open-source efforts based on Linux. Tizen is Samsung's most recent foray into developing an OS, building on the previous effort of Bada. It has gained the support of several mobile operators whose footprints are mostly in Asia, although no devices have yet been launched running the platform. Samsung has been the biggest device winner among those running Android, having optimised the UI and left its competitors to increasingly compete on price, a game they all cannot win. Particularly for Samsung, Android is less a brand (it rarely markets 'Android' itself in high profile product launches), and more a platform which it can build its own experience on. It now commands significant power in its relationship with Google, but with Tizen is seeking to hedge its position by offering an ecosystem that, while open source, it has more control over (similar to the iOS model).

Canonical is pushing its Ubuntu Touch OS, with a Microsoft-like promise of one unified operating system across mobile devices and the desktop. Canonical has yet to launch any official handsets, though it is said to be in talks with OEMs and mobile operators in several markets. The Sailfish OS, made by former Nokia employees at the spinoff Jolla, is trying to keep alive the MeeGo/Mer project abandoned by Nokia when it committed to Windows Phone with Microsoft. Both Ubuntu Touch and Sailfish claim to be operable on handsets designed to run Android, which may lower barriers to entry by allowing OEMs to leverage existing designs.

The promise of these budding HTML5 platforms is that, in theory, they take advantage of the ubiquity of the web yet still utilise the functionality of mobile handsets. This is done by having web APIs that connect to key phone features, allowing apps to be written in HTML5 that use, say, maps and GPS, and the contact address book. In addition, apps running HTML5 can often update offline, making these well suited to areas with network coverage that is patchy or slow, and helps avoid draining battery power (both are common issues for customers in many emerging markets). It is perhaps unsurprising that HTML5 developer support is highest in Africa and Latin America (where it is almost as high as Android, see Figure 15).
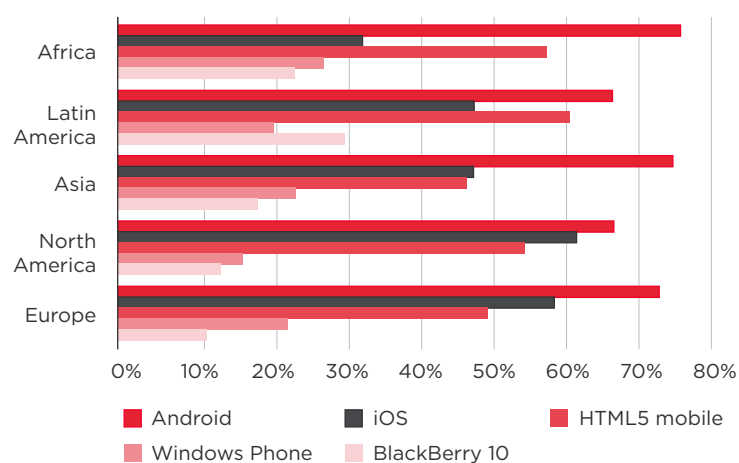

Figure 15: Developer mindshare by region

Source: Developer Economics report*, Vision Mobile, July 2013*

There are, however, a number of challenges. HTML5 is an open source technology, not (yet) an ecosystem in itself. While it holds obvious potential for interoperability across the web (potentially harnessing a sizeable base of would-be mobile internet users), most organisations pursuing this route are, after all, commercial with for-profit goals (Mozilla is an exception), which can reduce the incentive to co-operate. Partly for this reason, there is not yet a standardised web tool kit for use by developers (with Facebook's high profile switch away from HTML5 to native apps a blow). While this technology is designed to leverage the power of the internet browser, ironically the current state is highly fragmented, with the major browsers (Internet Explorer, Chrome, Mozilla) having different standards. In addition, the absence of a defined native app store (e.g. Google Play, Apple's App Store) means there is potentially less visibility and distribution power for developers to reach the consumer market. Finally, there is a risk of a diminished user experience without a full host of APIs that allow apps to be written on the web and use the functionality of the mobile phone.

These are not insurmountable, but need support. Public backing by the mobile operators so far underlines the desire to increase competition in the platform space, providing more choice for consumers and equalising bargaining power. We believe HTML5 as a technology has real potential to gain traction in mobile, but the likelihood of this would arguably be increased through consolidation of the vying platforms within this family.

It is perhaps helpful to borrow from the experience of the desktop computer market in making this point. These web-based open source platforms are challenging Google in mobile in not dissimilar fashion to the Linux challenge to Microsoft in the 1990s and 2000s desktop computer market (one difference, of course, being that Android is also open source). The Linux cause gained traction and support from some consumers and some manufacturers (e.g. Dell), but most of that support came over 10 years after the original Linux release. In retrospect, Windows' share was entrenched by then and reinforced by it being the default OS shipped with the majority of computers. As a result, Linux never made a significant dent in the Windows position, having peaked at a share of perhaps around 5% (Apple's share in desktop computing is similar, but much higher value given the high price point of the Mac, see Figure 16 with 'Other' being mostly Linux).

It is not possible to say whether that particular market would have evolved differently had support for Linux been stronger and earlier. However, in linking this back to mobile today it is also not hard to argue that for a challenger platform to have a chance, these conditions must be in place, requiring operator backing before a tipping point is reached after which a monopoly or duopoly is unassailable. We can also take this as a proxy for the minimum scale needed for platform viability (around 5%) implying that the sustainability of more than two ecosystems within the HTML5 milieu would be very difficult.
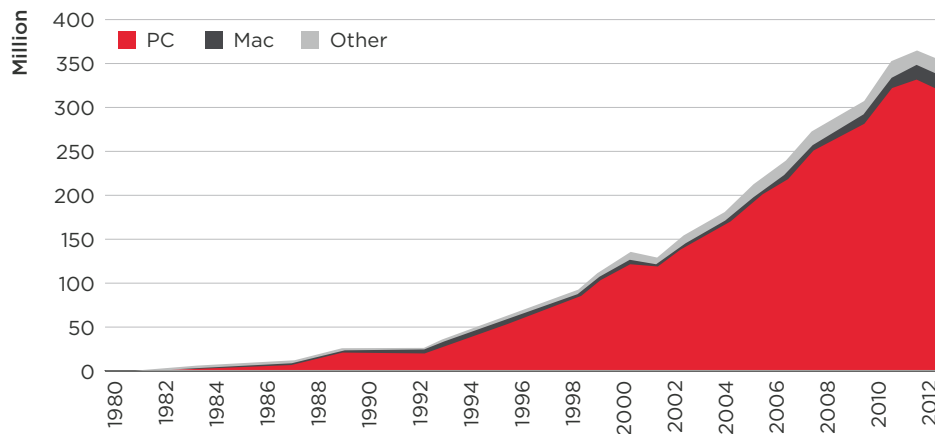
Figure 16: Annual desktop computer sales by OS, 1980-2012
Source: GSMA Intelligence, Gartner, company annual reports

Android – the largest incumbent, guarding against fragmentation

Which leads to Android itself. Commanding a share of around 80% of smartphone sales worldwide – both in mature and emerging markets – and having grown this steadily over the last 2-3 years obviously makes any challenge difficult without substantial operator and handset support. However, it is instructive to understand Android in the context of Google's wider strategy. Google benefits when more people are on the internet and from the data they generate, underlined by its commanding position in search advertising.

For this reason, Google has made Android available through a free licence to encourage its take up and spread across a wide range of handset manufacturers. While in its early days (2007-2010), there was no one dominant Android handset maker, Samsung has emerged to be just that over the last 2-3 years, with the other OEMs fighting for the remaining share on price. As a result, Samsung's clout has increased and it has sought to customise much of the native Android UI. While Google still benefits given that it remains the default search engine and provider of key apps such as Google Maps, it underlines a worrying trend towards increased fragmentation of the Android experience (see Figure 17).

It is important to make a distinction here between firms such as Samsung that use "certified" Android and those that use the Android Open Source Project (AOSP) version of the operating system. The AOSP is freely available to any device maker or developer to download and use as wished. However, if a device maker wants the full functionality of Android, including the ability to link to Google services (including Gmail, Maps, Google+, and the Google Play marketplace), they must register for the Android Compatibility Program, which requires certain hardware specifications and contract terms. When Google reports activations of new devices (last reported at 1.5 million per day), it is reporting the number of devices that are accessing its APIs for the first time, meaning that AOSP devices are not counted in those reports.

Most of the major device manufacturers have signed up to the compatibility program. Importantly, it is mutually exclusive, meaning that if a handset manufacturer joins the program in order to launch an official Android device, they also commit to not

launching any device with an AOSP version of Android. On the flip side, most of the manufacturers using the AOSP version are located in China. A notable example is Xiaomi, a young company that has come from virtually nowhere to ship over 18 million units in 2013 (around 2% of global smartphone sales). Xiaomi has developed a customised user interface far from the stock Android one, and has built up a strong and active user base through direct sales of its branded smartphones, which offer top-end hardware specifications at prices often lower than competing products.

For Google, the threat of this growing AOSP segment is that these devices can displace Google services, impacting mobile advertising revenues. This is especially salient in China, where Baidu (the dominant search engine in China) reported 130 million active mobile search users as of June 2013 and itself estimated 270 million active Android users in China. This implies that around half of Android users access a rival's search engine, lessening the value to Google. This could spread to other markets, with some Chinese makers having international ambitions (for example, Xiaomi is targeting a doubling of sales to 40 million in 2014, with selected international expansion).

In some ways, fragmentation is a necessary consequence for Google of running several versions of Android at any one time, with an average life expectancy of around 12-24 months (see Figure 17). The problem comes when there is inconsistency in user experience, having to push out updates to multiple versions and where the customised experience erodes the core power of the platform as a gateway to Google's stable of services (as an aside, this fragmentation may be good for operators as there is less chance of an OTT player deploying a service that would be interoperable across a massive Android user base, and there is less risk of power being concentrated in the hands of a few OEMs).
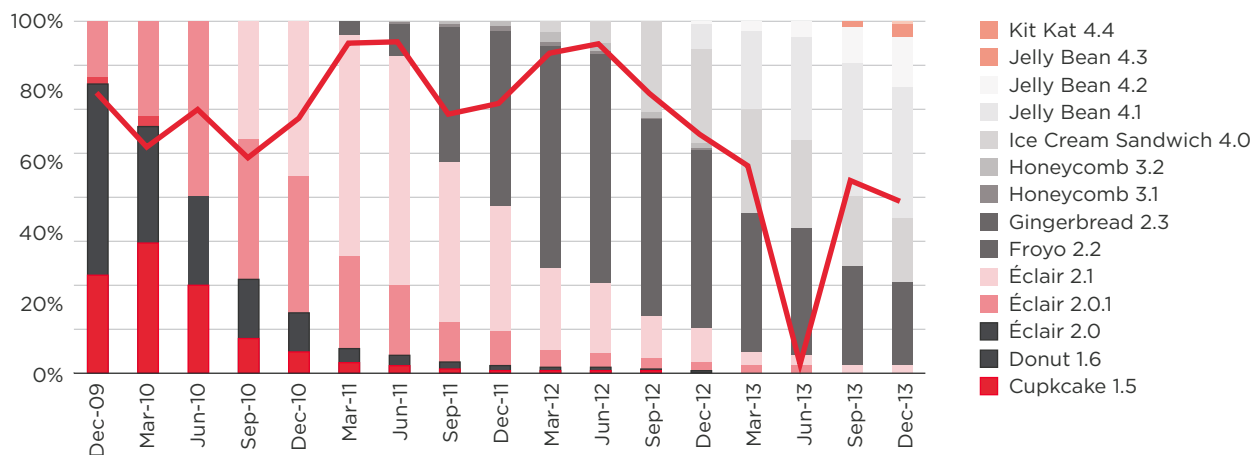
Figure 17: Distribution of active Android devices by version, 2009–13
Source: Android Developer, GSMA Intelligence

(Note: HHI is a measure of concentration. The downward slope of the line implies more versions of Android in use at a given time)

Google is, of course, aware of this. At the technical level, in 2013 it quietly introduced a workaround to mitigate the fragmentation issue. Instead of pushing out new versions of the Android operating system, it created a system application called Google Play Services (GPS), and transferred as much functionality as possible from the operating system to GPS. Unlike normal apps, GPS has deep integration into core OS functionality and permissions, including the ability to update itself in the background. In practice, while Google will likely continue to make the AOSP code available, it appears to be exercising more control by making increasing amounts of the operating system proprietary and under its direct control.

At a wider level, its mobile strategy goes well beyond Android itself, guarding against the risk of Android becoming less popular and widely used. Its recent purchase of Nest Labs underlines its perceived importance of the Internet of Things. It also buttresses itself by supporting selected other platforms that help drive traffic to its web properties, with it funding Mozilla through royalty payments to the tune of around $300m per year. All of this is in an effort to avoid becoming the disrupted. Android's position is strong, but by no means set in stone, particularly in emerging markets where smartphone penetration is still low and where in both emerging and mature markets there are an increasing number of challengers also adopting an open source model at the low price end that could prove sustainable with a critical mass of operator, developer and handset support.

Route to market challenges – how much do the operators control?

Regardless of quality, all handset manufacturers face the challenge of bringing devices in front of consumers, whether that is through mobile operators, other retailers or independents. For mobile operators, the same pragmatic reality exists, with public support for platforms having to be reconciled with actual budget spend from handset procurement officers. We show below a selection of the 30 largest mobile markets worldwide, plotted based on their income/capita and on the proportion of handsets actually distributed through mobile operators (see Figure 18). Fragmented markets are those with a majority of handsets sold through channels outside the mobile operators (e.g. specialist retailers, independents), with markets becoming more consolidated as more handsets are sold through operators. The key point is that consolidated markets have more operator influence over the handsets sold (e.g. through marketing and subsidisation), whereas fragmented markets are determined more by consumer demand. There are important regional differences, with countries in Europe, Latin America and parts of East Asia more consolidated compared to Africa and South Asia more on the fragmented side (note in some markets, such as Brazil, actual retail volumes distributed through mobile operators are lower than wholesale).
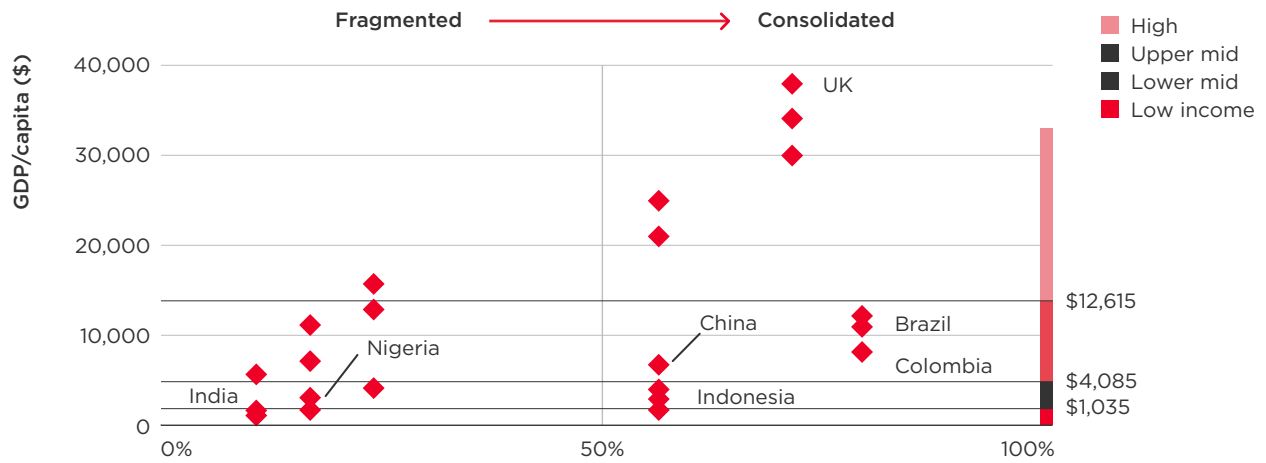
Figure 18: Fragmented vs. consolidated handset distribution markets
Source: GSMA Intelligence, World Bank, Strategy Analytics

(Note: smartphone units sold through mobile operator channel)

For handsets running a platform with low market share (e.g. HTML5, Windows, BlackBerry), operator influence is important in driving this up. The implication is that fragmented markets such as India (where the majority of handsets are sold through independent shops and stalls) and parts of Africa make it more challenging for newcomer platforms because there is less operator influence and more reliance on above the line advertising to mass market audiences (which is easier for well known brands, see Figure 19).

Conversely, even excluding China (the largest mobile market in Asia) it is expected that the rest of East Asia will sell over 600 million smartphones over the next 4 years (in countries such as Thailand and Indonesia), with over half of these going through the mobile operator channel, and a fast rising proportion under $100. Brazil and other consolidated markets in Latin America are likely to follow a similar course (this is perhaps one reason why operators have targeted several Latin American markets with Firefox OS).
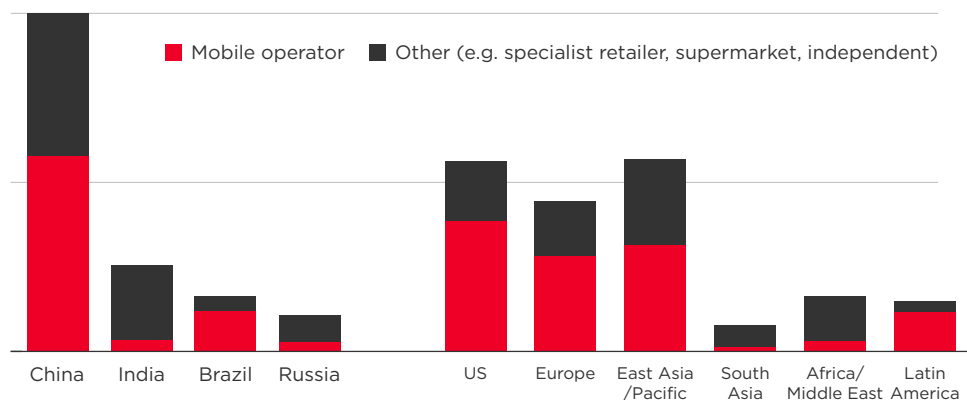
Figure 19: Smartphone sales volume by channel, top 30 mobile markets by subscribers, 2014–17
Source: GSMA Intelligence, Strategy Analytics

Linking this back to the quadrant analysis, we forecast countries in the bottom right section (e.g. low, lower middle and upper middle income that are also 'consolidated' distribution markets) to account for around 2 billion smartphone sales from 2014-17, or 43% of the global total (see Figure 20). While China is the largest country within this, there are others that are large, dynamic and growing (shipping over 10 million smartphones per year), with concentration in East Asia and Latin America – for example Indonesia, Thailand, Vietnam, Philippines, Brazil and Mexico. At a broader strategic level, while achieving scale is needed to be a sustainable competitor to established players (e.g. Google and Apple), the best chance of doing this is likely to prioritise gaining traction first in these specific regions and sub-regions – building presence, brand, lock-in and the confidence of mobile operators – before further expansion.

| | | Share of smartphone sales | |
	GDP per capita	Fragmented markets	Consolidated markets
Developed	High income (>$12,615)	5%	37%
Developing	Low income (<$1,035)	15%	43%
	Lower-middle ($1,035–4,085)		
	Upper-middle ($4,085–12,615)		

Figure 20: Smartphone distribution, 2014–17
Source: GSMA Intelligence, World Bank, Strategy Analytics

About the authors

Tim Hatt Senior Analyst

Tim is the head of research for emerging markets at GSMA Intelligence, having joined the group in October 2012. In this capacity, Tim has responsibility for the team producing research reports and presenting externally at conferences and public speaking engagements. Prior to joining the GSMA, Tim spent 6 years in London as an analyst covering telecoms and a variety of other sectors.

Barbara Arese Lucini Analyst

Barbara is an analyst at GSMA Intelligence focusing on research for emerging markets. Before joining GSMA in April 2013, Barbara worked for FrontlineSMS in London and at Accenture in Italy. She holds an MSc in Development Studies from SOAS, London and an undergraduate in Mathematics from Università Statale di Milano, Italy.

Corina Gardner Senior Manager

Corina manages the GSMA Intelligence, Mobile for Development resource. Building on ten years of international development experience across Africa and Central Asia, Corina brings a breadth of first-hand experience to the team. She joined GSMA in 2010 after completing an MBA from Cambridge University focused on Energy and Environment.

Bryan Pon

Bryan is a Ph.D. candidate at UC Davis, with a focus on mobile technology within emerging markets. He is also an Emerging Venture Analyst for the UC Davis Energy Efficiency Center, and has worked with a number of companies in Silicon Valley over the last ten years.

gsmaintelligence.com • info@gsmaintelligence.com • @GSMAi