

**The potential of mobile applications for positive
social and economic change in rural
communities**



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The only real voyage of discovery consists not in seeking new landscapes but in having new eyes".¹

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1 Introduction - Mobile Applications

In the year since the 2009 CTA Observatory on mobile services there have been ongoing and significant changes in the landscape reviewed in its accompanying paper². At that time it was clear that the overall domain and the mobile for agriculture and rural development sub sector were already in a second phase of expansion. In the paper and resource material we described the continually accelerating growth of the sector, both in adoption and in the diversity of opportunities and innovation. We described maturing systems that had been in place for two or three years, such as <http://www.frontlinesms.com>; the emergence of successful business models, as in www.Esoko.com; and evidence that many of the interventions were avoiding the mistakes of early ICT4D projects by integrating their new schemes with community and institutional structures, as with the Google/ Grameen/BROSDI family of applications launched in Uganda in 2009³. The growth and evolution of mobile digital devices is quite exceptional, even in the context of the scale of innovation in other sectors of the digital economy. This dynamism was one of the reasons why 2009 Observatory participants recommended that CTA continue and extend its work on the use of mobile digital devices in agriculture and rural livelihoods. Participants argued that many people working in the sector, including decision makers and senior managers, are unable to keep up with the changes and are therefore not fully aware of the nature and potential of the applications being developed using the technologies. This is especially important in the policy arena. One of the defining characteristics of the m-agriculture sector, unlike others in ICT and Development, is that the private sector is a primary mover. This generates particular challenges in terms of ensuring equitable access by people in rural areas to the benefits of the new technologies as well as how to encourage sustainable innovation and the growth of profitable businesses.

It is for these reasons that CTA is organising a second Observatory meeting on m-agriculture from 22-24 November 2010 in Johannesburg, South Africa, as part of a continuing programme of work. The output from 2009 is collected in an online resource⁴, a wiki organised according to the analytical framework used which focused firstly on channels of communication – how consumers interacted with and were reached by different types of services – and secondly, on sustainability of m-agriculture interventions. This approach is still useful as an organising principle and we aim to review and update the existing material during the 2010 Observatory. However, in 2010 we are focusing on one specific area of development in the field, the development and use of mobile applications. By this we mean software programmes that are written to work on mobile devices. For reasons explored below, mobile applications are seen as particularly promising in terms of practical support for agriculture and rural development.

There has been a lot of interest in mobile applications recently, with several high-profile projects and competitions for the segment, including mWomen BoP App Challenge from the GSM Association and Vodafone⁵, InfoDev's Mobile Applications Hub programme⁶ and some recent large Gates Foundation grants for the development of mobile applications⁷. In this paper, mobile applications are located in relation to our earlier analysis of trends; it describes some of the features of this market segment and its underlying technology; it illustrates how they are and might be used in agriculture and rural development and lays out some of the key issues in terms of policy and regulation that will be discussed at the 2010 Observatory meeting.

1.1 What do we mean by an “m-app”

In this paper we use the term *mobile application* (m-app) to refer to a software programme that has been developed for small low-power handheld devices such as mobile phones or tablets. These applications are either pre-installed on devices during manufacture, or downloaded by customers from app stores and other mobile software distribution platforms.⁸ They are different from standard services or applications which run on websites (web applications) which can be accessed by mobile devices with Internet access (we will return to these later). M-apps perform a wide range of functions and they are available for all but the most basic phones⁹. They put phenomenal power in the hands of individuals, especially when they are combined with easy access to wifi connectivity and affordable tariffs (see box).



I consume a lot of **media** on my iPhone when I travel. Using wifi or the normal phone channel I check **email**, and catch up on snippets like **test match scores** or **weather forecasts**. I listen to **podcasts**, read **downloaded** news stories, and watch **video** clips. I have a large collection of **music**, converted from vinyl, copied from a CD or bought online, as well as a collection of **photos**. I **interact** with other people on the move using the **phone** as a phone, **texting, emailing and tweeting** - using **SMS** or a separate downloaded application that tracks different groups and issues. I often use **Google maps** or other tools for directions to my final destination, using the convenience of its **location finder** functionality and still marvelling that it tracks me in real time as I move. I wonder even more at being able to identify the nearest Thai restaurant by pointing the camera on the phone and using **augmented reality** applications, or playing with the Museum of London application¹⁰ shown opposite which displays historical overlays of locations.






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However, this style of use is not simply a rich-world phenomenon. In Nairobi, the cost of a basic phone with access to the Internet starts at US\$25¹¹. 1 Mb of data transfer costs between US\$ 0.02 to 0.10. 'I use my phone for email and Facebook status updates and I never use up all of the Mb', said Tezira Lore, a twenty-something Kenyan communications executive working with [ILRI](#). Like her peers across the globe, Tezira is constantly in touch with friends and colleagues using social media (largely Facebook). They connect over mobile phones or from their laptops using wi-fi. And it isn't only the young or those from larger urban areas: at a July 2010 Research Communications workshop in Nairobi a Mozambican community worker from CIUM was chatting on Facebook during workshop sessions with an older, more experienced

colleague in Maputo to share what he was saying and bring in her contributions.

Mobile phones are the most significant of the mobile digital devices currently available. We distinguish three levels of functionality, described in the [2009 wiki](#) and [paper](#):

- **Basic phones:** the most common mobile device in ACP countries, its functions are generally limited to Voice, Voice to text / text to voice, Interactive voice response and Short Message (SMS). Applications which can work on these phones are often referred to as AHAN, *Any Handset Any Network*
- **Mid-range phones:** as well as the functions referred to above this range of phone includes functions such as Data Transfer through [GPRS](#); Mobile Applications using basic software tools, often written in [Java](#); access to the Internet and additional features such as a camera or Bluetooth connectivity.
- **Smart phones:** as well as all the functionality referred to above, smart phones come with a much wider range of features, including Sensor Rich Application (All Purpose Tool) location based services using [GPS](#), Social Network features, more powerful tools to support access to the Internet as well as video and audio recording and sharing.

Basic phones are simply communication devices: users can talk to or text each other. M-apps transform mid-range and smartphones into multi-functional devices. Apart from voice calls, cellular phones are now used for Internet surfing, email, music, news bulletins, video on demand (VoD), social networking, banking, billing and other such related activities. As Robert Hamilton, Google's Mobile Product Manager said recently, "a mobile phone is a computer in your pocket with the abilities of speech via its speaker, touch and sight via its screen, hearing via a mic, and spatial awareness via GPS. That makes it one of the most powerful tools ever created"¹².

The distinction between mid and smart phones is not a hard and fast one. The major distinction relates to the sophistication of the operating system on the phone. All but the most basic phones are able to run applications based on platforms such as Java ME, a smartphone allows the user to install and run more advanced applications, usually targeted at a specific device. M-apps on smart phones are powerful because they access all the functionality, such as GPS, camera or audio.

At the same time the device market continues to change, notably in 2010 first with the introduction of the iPad and then several competing "tablet" platforms, as well as Amazon's second version of its *Kindle* eBook reader. The significance of tablets and e-readers is explored below in section 4.2. At the same time, mobile phone manufactures and channel operators have been rushing out new smartphones in a race to catch up with the iPhone, which was itself recently upgraded.

Six features of the m-app ecosystem are significant for a discussion on their role in agricultural and rural development.

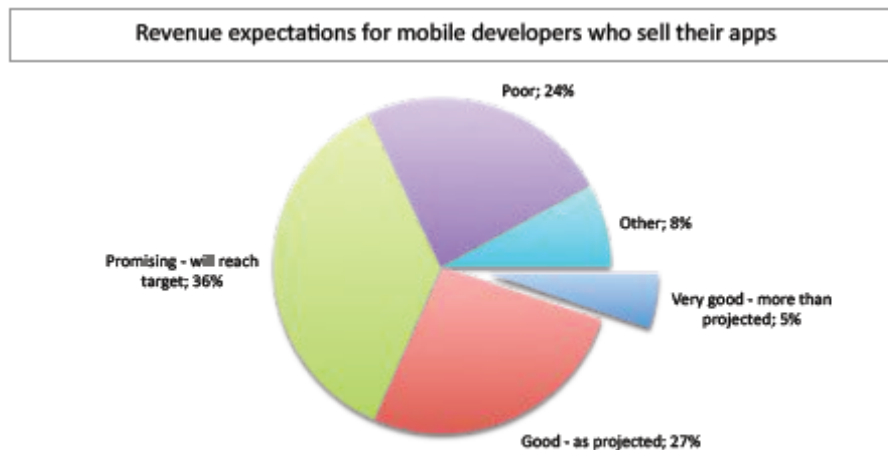
- **Mobility and portability:** m-apps can operate both as part of the normal interactive features of the device and in standalone mode. This means users can combine phone functions such as camera and location functions to share geo-coded pictures to colleagues, friends or family. It also means that users can access functions and information when they are not connected, for example, accessing information on plant or disease identification from a stored database.

- M-apps as Internet Cloud clients:** in contrast to the above, many mobile applications work effectively because most of the processing takes place in large computers located far from the user, thus enabling phones to access sophisticated applications that would previously have required too much processing power to execute locally or to access real-time information from elsewhere. Such computers are often said to reside in the Internet “cloud”. For example, file storage that is synchronised between different devices such as that offered by www.dropbox.com, is a heavily used family of cloud-based applications which store the files on remote servers and make them available on demand on the remote device.



- Open development market:** all the major device manufacturers now support applications written by independent software developers. Since there is such explosive growth in this sector, innovative applications have flooded the market. Some have been developed in an entrepreneurial spirit, others from a sense of fun or adventure, others for political or campaigning reasons and some for national and international development purposes.
- Affordability:** applications are relatively cheap and easy to develop. Clearly, there is a trade-off between quality and range of functionality and the cost and effort required to develop an application. Nevertheless, it is possible to develop a functional, useful mobile application within a few weeks.
- Single Function:** mobile applications tend to answer single questions, like, ‘where is the nearest pharmacist?’ They generally provide simple services, some informational – downloading a map, finding train-times; some augment the inherent functionality - adding zoom-like functions to the inbuilt camera; some are for entertainment - adding a radio station receiver or new games and some are social – connecting to Facebook or linking the GPS functionality to a social network to enable people to find similarly registered friends.
- Financial Sustainability:** this was a central issue in the 2009 discussions about mobile services. We noted then that the use of mobile phones in development brings in its train opportunities for revenue generation that were not available with other ICT tools, notably the possibility of revenue sharing with the telecommunication carriers. The sudden explosive growth of the mobile application economy was generated by m-app stores where phone or tablet users download m-apps. Apple’s platform set the pace but has been overtaken by Google’s *Android* offering, and both are being chased by their competitors. “If there’s a single reason for the mass-entrance of developers into the mobile market, it is app stores. We view app stores as direct developer-to-consumer channels, i.e.commercial conduits that streamline the submission, pricing, distribution and retailing of applications to consumers. App stores have streamlined the route to market for mobile applications, a route that was previously laden with obstacles, such as lack of information, complex submission and certification processes, low revenue shares and regional fragmentation”¹³. The promise of the stores is an opportunity for developers to sell their apps in large numbers, and the data shown below demonstrates that there is a greater return than in many other small start-up business sectors.

At the same time, for content providers, m-apps provide cheap access to a large and growing market, often requiring simply the re-purposing of their content for the new format. There is also the opportunity for such apps to recoup their costs through charging for the initial download as is the case with Apple's App store.



Source: Mobile Developer Economics 2010 and Beyond. Produced by VisionMobile. Sponsored by Telefonica Developer Communities. June 2010. Licensed under Creative Commons Attribution 3.0 License. Any use or remix of this work must retain this notice.

All this activity represents a major opportunity for the organisations and individuals working in the agricultural development sector, amply demonstrated by the *iCow* application which recently won the first Apps4Africa prize¹⁴. *iCow* is a simple voice based mobile application that helps farmers track the oestrus stages of their cows helping them to manage their breeding as well as nutrition leading up to calving. This is done via a series of voice prompts and SMS messages that are sent to the farmer during the course of the 365 day cycle.¹⁵

1.2 Examples of m-apps

This list is taken from the author's iPhone. It is not intended to be an exhaustive list of applications but illustrates some of the categories of application available, including:

- Local copies of online databases, usually available unconnected and synchronising when connected (in the table we indicate those that require an internet connection). The applications are accessed through a variety of interfaces, some simple and mostly text based and others using visual and/or audio functions to assist the user

Application	Function	On-line
iTunes	Local copies of music, podcasts, videos, and tutorials from iTunes University	
Tree id	Portable database, visual interface, diagnostic support	
Chirp	As above with audio	
Itunes podcasts (and music and videos)	On and offline storage and display of multi-media material	
Off maps	Downloaded maps, using Open Map and other libraries	
Audioboo	Recording and web publishing	
WHO Health Map	Location linked health database information	
Sceptical science	Downloadable database of information about climate	

	change, links online if connected	
Dropbox	File management utility, synchronises with cloud storage, across multiple devices	Y

- Phone function linked applications that link to internal phone functions, including camera, audio recording and playback or, location and movement sensors

Compass	Sensors	
Dragon dictate	Voice to text	

- Games and simple utilities

Ocarina	Musical instrument !	
Labyrinth	Game	
Instapaper	Stores web pages for later viewing offline	

- Tools that use the phone as an online broadcasting tool

Met office	Online, location linked	Y
Tweetdeck, Linked in, Facebook, Dopplr,	Online, social networking	Y
Radio times	Online magazine	Y
Ustream, qik	Real-time broadcasting	Y
Youtube	Viewer of online video (note: needs special attention to play Flash files)	Y
Google voice search	Voice search	Y

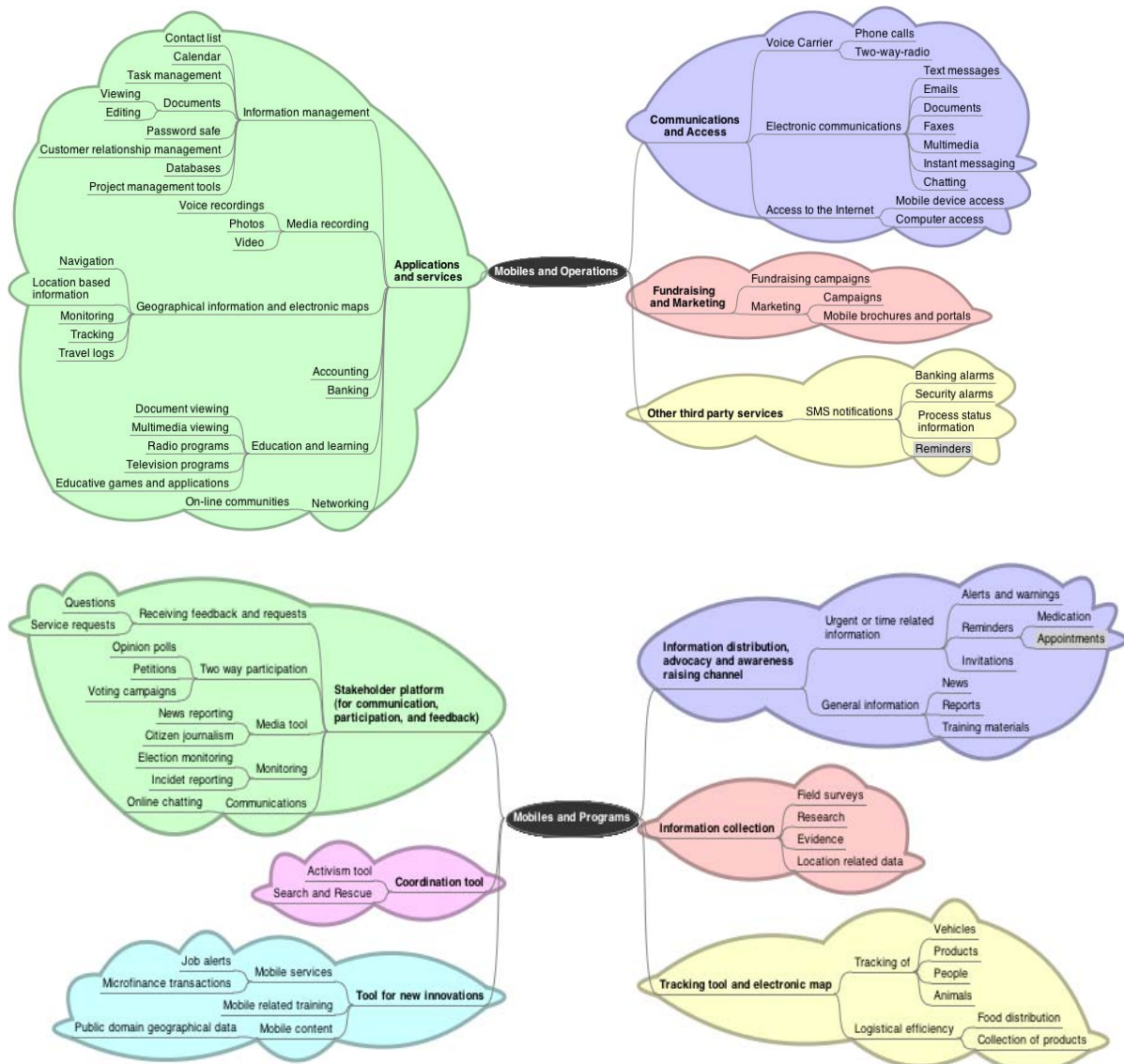
- Tools that provide local clients to online services such as social networking, video display, Skype, (voice and text communication using the Internet), news and magazines. These need to be online to access information but some also enable downloading to view offline

Guardian	On and offline news/magazine reading	
Skype	Through wifi, VOIP	Y
Train times		
London bus		
Shazam	Music recognition: fun but also serious sound matching to online database	
Toggl	Mobile client for recording information, to be synchronised with online database when connected	

- Phone function linked applications needing either a phone or wifi connection

Wikitude	Information from an open Wikipedia like resource with information about what is close to you in your current location	Y
Brightkite (foursquare)	Social networking tool identifying who of your friends is available close to you current location	Y
Layar, yelp	Augmented reality, uses location and connects to online database to provide location specific information, viewable using camera	Y

However, the much wider range of applications available on all mid-range and smart phones is well illustrated in “The innovative use of Mobile Applications in East Africa” by Johan Hellstrom¹⁶. In Appendix One we include the applications from Hellstrom’s report for SIDA that he categorises as for Agriculture, but many m-apps from other of the report’s categories are also relevant. The findings of the report are eloquent testimony to how astonishingly rich and diverse the m-apps sector has become in a short time, so much so that there is already a new, specialist search engine, www.mimvi.com, targeting the mobile sector. A richer picture of how the use of mobile phone based applications has become mainstream in development sector operations and programme activity comes from these Ungana-Africa diagrams.¹⁷



1.3 Open or tied applications

As we noted in 2009, “it’s undoubtedly true that the iPhone has changed the handset application market. Having transformed the online music business through the provision of a site supporting micro-purchases (one track at a time) Apple applied the same principles by providing a business and promotional platform for creative developers to develop and sell software applications for iPhone users. The business opportunity generated a flood of innovations tailored to exploit the features of the

device”. However, the Apple App Store is a classic “walled garden”, in that Apple retains control of what applications are available through iTunes for download. This limits considerably what users can access in terms of content and applications. To access the enormous and growing iPhone/iPad/iPod user base, content and application providers have to load their material onto one of the Apple platforms. While this in itself is not necessarily a major obstacle to providers it does mean that it must meet Apple’s own content and application guidelines but also means it can only use the environment available on the Apple devices. This means, for example, that Java based applications and Flash videos aren’t directly accessible to Apple users¹⁸, which blocks a huge amount of otherwise potentially useful content. While the tight control of what software is available on the i-devices has clear advantages in terms of quality control and restricting the spread of malicious software, it is seen by many as unacceptably restricting and authoritarian. And as we show in the Futures section below, Apple’s iTunes centred strategy is a strong platform for expansion into other areas.

We wrote in 2009, “all other handset and network providers are racing to catch up with Apple which means growth in potentially useful applications – many of which will be on more open environments so they can be transferred between devices¹⁹ - but also increasing opportunities for small or niche players to develop applications targeting the rural poor”. We highlighted the importance of Google’s Android mobile application platform being completely open. Google make no restrictions on what is available from the Android application platform. This is one of the reasons why Android is the fastest growing mobile application development environment (see below) and the reason why trend-setters such as *Esoko* have chosen to develop their m-app using Android. As Torsten Herbst, the *Esoko* app developer pictured opposite writes on the blog, “There are already new Android phones out in Kenya for \$100 and prices are coming down fast. So just as mobile phones came down in price over the last few years to be affordable for farmers in Africa, so will the new Android devices today. And as the number one selling smartphone operating system it will only be a matter of time before Android phones become available to traders and farmers across Africa at affordable prices”²⁰



1.4 Mobile Device Applications and the Internet cloud

The iPhone and the iPad work with Apple’s iTunes. iTunes was originally the music platform introduced with the iPod music player and still functions as a music library and player application on all Apple devices. It was rapidly upgraded to handle video and podcast material and, with the introduction of the iPhone, it became the online synchronisation platform through which software is downloaded as well as all forms of content and application. Without necessarily knowing it, iPhone users thus joined the world of Internet [cloud storage](#), in the sense that much of their data and applications are being stored on the Internet by Apple. This has obvious advantages in terms of conveniences such as back-up or automated updates but has the same limitations described above. The lack of any open standard connectors on the iPad/Phone further restricts users. By contrast, while Amazon’s *Kindle* is also tied to the Amazon website for software and purchases, it crucially has a USB connection which means all kinds of text- based content can be uploaded.

An essential point about these examples is that the content and processing that takes place on the servers run by companies, in the Internet cloud is in many ways more important than the simple software front-end on the mobile application. As well as a

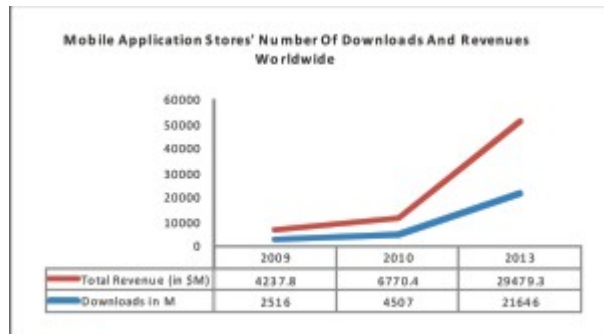
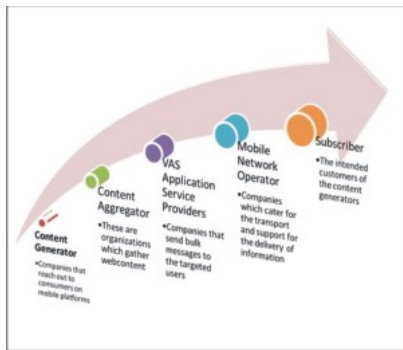
channel to consumers of music, video and the media that Apple and Amazon are successfully exploiting, they are also a channel for newspapers, magazines and other publishing and broadcast operations. They recognised immediately the potential of the new distribution channels and rapidly developed applications to access their material. International development and research organisations already have systematically classified and indexed material that could be made available through the devices.

In the science domain, a number of applications are worth noting. Applications exist to help identify birds from their song, appearance or flight pattern (*Chirp*) and to differentiate trees. *The Plant Doctor* is the only application on the Apple Application Store to identify common crop and plant diseases. Developed by a small US consultancy as a promotional tool, it has nothing of the multi-function sophistication of *Chirp*, nor the seamless offline/online, layered menu structure of *Skeptical Science*. We have to note that there are no similar applications to support the small farmers struggling, say, with banana leaf wilt. Similarly, while the location linked infectious disease app, *HealthMap*, was an early, well featured venture from WHO, there is as yet no sign of agriculture targeted apps exploiting the features of smart phones. The apps listed by Hellstrom are, understandably, mostly SMS based or targeted for mid-range phones. While there will continue to be a significant market for this level of app for some time to come there is also a need for developments that take the market forward.

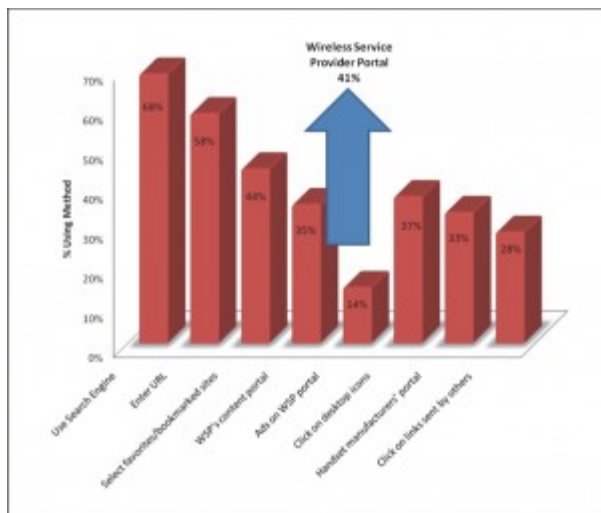


1.5 Trends from outside development

There are three potential roles for agriculture development sector organisations from the five illustrated below left: content generator, content aggregator and what are known in the commercial world as Value Added Services (VAS) providers²¹. Mobile Applications have a particular role to play in supporting VAS.



It is the VAS market that is attracting most attention in commercial sector. The application market growth is expected to rise from US\$ 1.94 billion in 2009 to US\$ 15.65 billion in 2013. According to Gartner research (December 09), global downloads in mobile application stores are expected to surpass 21.6 billion by 2013 (figure above right).



Recent research by TNS²², illustrated opposite, highlighted the change in

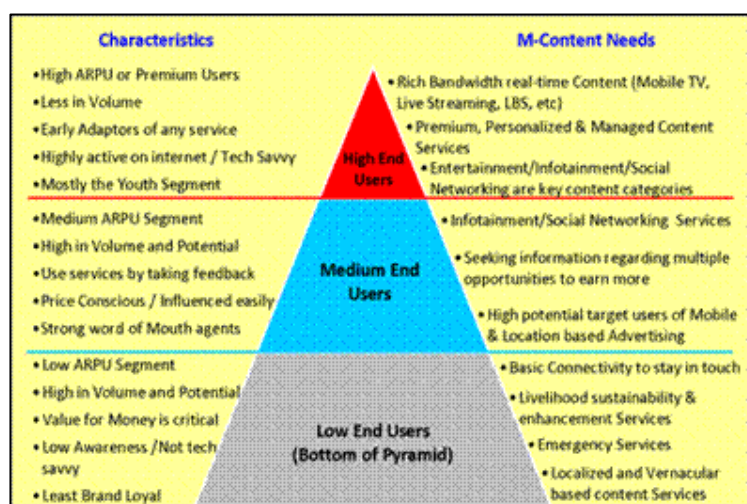
technology usage trend of the customers, indicating where market for premium applications and content has significant growth for potential. According to research, 40% of the users pay to download mobile applications or content. The Qualcomm research also revealed that 63% of the mobile users would spend more time accessing and purchasing content online if it was easier to find; 80% of the users had problems obtaining content on their handsets and whereas 58% of the users believe in carrying their content along with them regardless of the device. By analyzing these trends, one can easily intuit that the future of VAS is bound to be enormous.

1.5.1 Rural Services

The intersection of VAS, for mainstream mass markets, m-apps and the attraction of the huge new BoP markets is keenly followed in online-magazines across the globe. The following extracts come from a Pakistan based service:

“Interestingly today’s mobile devices have shifted the entertainment from a content or network play to a device based play. Mobile devices with integrated music and video player, FM and high memory features have flooded the market accompanied with low cost associated with it. Entertainment content from the web world is being fed into the device memory and is being used. Even games for this case are downloaded from the web and dumped into devices. In such an unfavorable scenario, the Operators are making a lot of investments in infotainment content and services”²³.

“In emerging markets especially in countries like India, majority of the population is rural i.e. the Bottom of the Pyramid (BoP). Rural teledensity in India was at 16.54% as of May 2009 compared to urban teledensity of more than 88.6% around the same period. This figure is expected to reach about 36.25% by 2013. With such mass revenue potential hanging



around, operators are shifting their focus on VAS for BoP. In India, initiatives by Airtel, Reliance and Idea Cellular to connect with their rural masses are already visible with their tie ups with livelihood content providers like IFFCO and Reuters Market Light for services related to agriculture, weather and livelihood.”

2 Technical Background

2.1 Constraints in ACP

A review of the technical options is an appropriate point to revisit the issue of constraints to the use of mobile phones in general and m-apps in particular. This aspect of the landscape we described in 2009 has not changed significantly in relation to fundamental issues to do with infrastructure, capacity and, above all, costs. Many communities, both rural and urban across the ACP countries still struggle with limited and unreliable electricity; limited literacy presents a barrier to many, and those who

had to leave education early, or couldn't afford it before the advent of free primary education, are disproportionately female and rural. In common with the rest of the world, older people are at risk of further disenfranchisement as a result of the late arrival of new technologies in their lives. This is accentuated by the prevalence of English on the Internet, generally also true of content available through mobile devices.

Above all, costs for even the most basic of services using SMS remains obstinately high. On the crippling impact of high mobile connection and SMS prices, Tim Berners-Lee is the latest high profile advocate of, "better, more low-cost data plans for mobile phones". He goes on, "carriers should want to offer these plans because once people get a taste of what a data plan can provide, they're potential customers for an upgrade to a more expensive plan that offers even more data and would generate more revenue for carriers."²⁴

Steve Song continues to be one of the most eloquent commentators on the impact of prices in terms both of equity of access and the spread of innovation. He notes:

"Access in the United States has achieved the status of invisibility. No one thinks about the cost of watching hours of YouTube videos. In South Africa, none but the wealthy are unaware of how much bandwidth they are consuming at any one time. Have I reached my "cap"? What's the price per gigabyte now? And there's the rub. The affordably-connected world is on a path of accelerated innovation. The key word there is accelerated. That means that the innovation gap between the connected and the unconnected world is increasingly non-linearly... twice as bad tomorrow, four times as bad the next day and eight times as bad the next".²⁵

However, it's important to note that there are a few examples of a more enlightened approach. Steve Song and Eric Hersman (the latter of Ushahidi) were the first to recognise the potentially ground-breaking nature of *Facebook Zero*, the very lightweight mobile interface to Facebook which is largely free because Facebook have negotiated deals with over 50 mobile operators around the world²⁶. By contrast, Nokia is focusing on optimising its own technology to reduce internet access costs. Affordability of Web access is an area which Nokia thinks about when building their technologies. "Nokia's Ovi Maps service uses compression so as not to need data access when zooming in and out, unlike competing service from Google Maps. Nokia's messaging services also compress data and Nokia's recent acquisition of mobile Internet company Novarra was primarily for access to its proxy-browsing browser technology, which saves on clicks, while also providing faster and more efficient access to the Web"²⁷

2.2 Options

The status of the mobile application market is defined by two main drivers. Firstly, the development of software development environments by overlapping groups of companies, including handset manufacturers, telecommunication operators and software developers (and, of course, Google which seems to defy categorisation given its breakneck growth and evolution). Secondly, the operations of specific organisations such as Nokia with a particular interest in developing markets. We consider in this section the software ecosystems.

2.2.1 Platforms supporting devices by multiple manufacturers²⁸

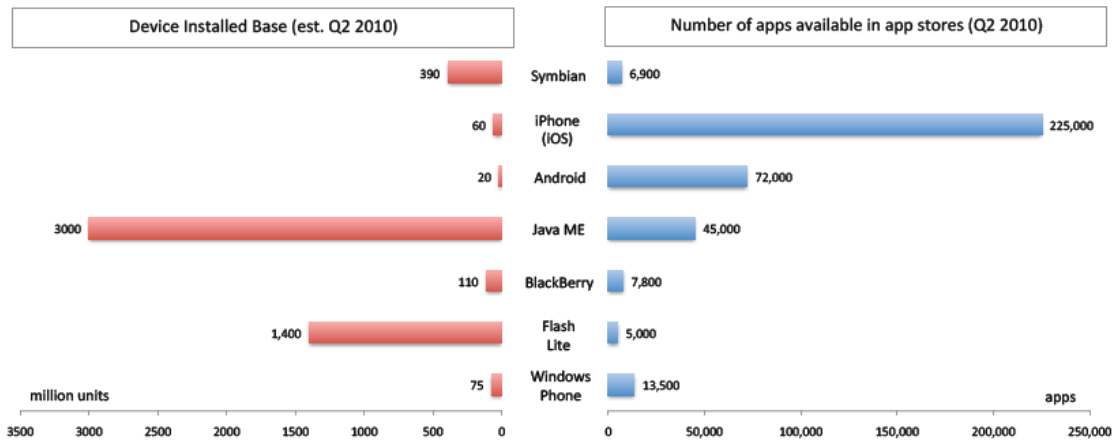
- **Java ME** This platform generally produces portable applications, although sometimes device-specific libraries exist (commonly used for games), making them non-portable. It is often used to provide simple applications on feature phones. Applications (including their data) cannot be larger than around 1 MB if they are to run on most phones.
- **Symbian platform** Designed from the start for mobile devices, the Symbian platform is a real time, multi-tasking Operating System specifically designed to run well on resource-constrained systems, maximising performance and battery life whilst minimising memory usage. The Symbian Foundation maintains the code for the open source software platform based on Symbian OS and software assets contributed by Nokia, NTT DOCOMO, and Sony Ericsson. The platform is fully open source. Over 300 million Symbian OS-based units have been shipped and Symbian holds more than a 50% market share globally.
- **Android** Android is a Linux-based platform from the Open Handset Alliance, whose 34 members include Google, HTC, Motorola, Qualcomm, and T-Mobile. It is supported by over 34 major software, hardware and telecoms companies. Application programming is primarily done in Java.
- **Windows Mobile** is a variant of Windows CE for mobile phones. Windows CE was originally developed for palmtop computers and Pocket PC PDAs with stylus-touch screens, and later adapted for use with keyboard-equipped smartphones. Phones have become the largest installed base for CE, though market share has fallen since the introduction of Android and iPhone. Windows Phone 7 is a substantial redesign that provides a richer user interface.
- **Palm OS** formerly had a strong enterprise following in the important US market, based on Palm PDAs
- **Palm webOS** is Palm's follow-on proprietary mobile operating system running on a Linux kernel which supports multitasking. Launched with Palm Pre and Pixi, now owned by Hewlett Packard.
- **Flash Lite** Used for devices that support the Flash Lite player. Microbrowser based. Lightweight functionality provided via a web-interface

2.2.2 Platforms supporting devices by one manufacturer

- **BlackBerry** Supports push e-mail, mobile telephone, text messaging, internet faxing, web browsing and other wireless information services as well as a multi-touch interface. It has a built-in QWERTY keyboard, optimized for "thumbing", the use of only the thumbs to type. The BlackBerry devices soon took a dominating position on the North American smartphone market.
- **iOS (Apple)** The iPhone and iPod Touch SDK uses Objective-C, based on the C programming language. Currently, is only available on Mac OS X 10.5 and is the only way to write an iPhone application. All applications must be cleared by Apple before being hosted on the AppStore, the sole distribution channel for iPhone and iPod touch applications. However, non-Apple approved applications can be

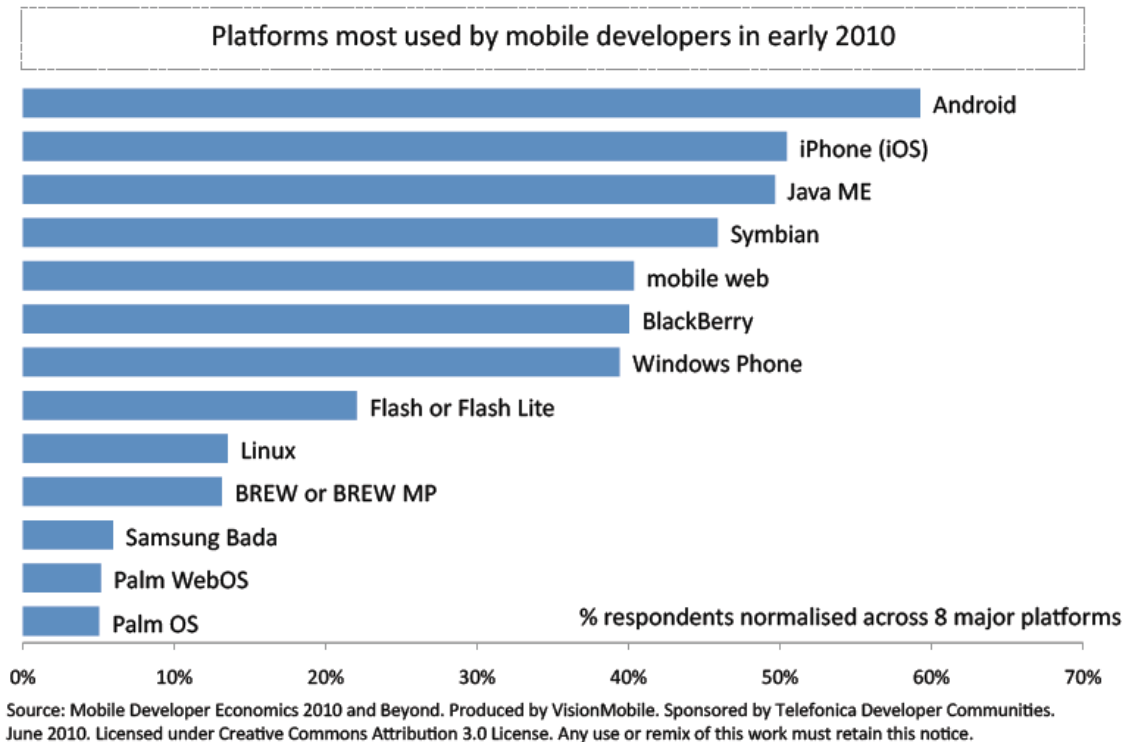
released to jailbroken iPhones via Cydia or Installer. This system is also used for the somewhat larger iPad which is smaller than most notebook computers.

The *Mobile Developer Economics 2010* report suggests some interesting pointers to trends in the use of these systems, demonstrating that while Java ME remains by far the most used operating system it has largely been spurned by the mainstream m-app developer community. As the report notes (see chart below), “These disparities stem from the origins of the two ecosystems; on the left hand side of the chart, the embedded software industry ecosystem has focused on enabling handset OEMs to differentiate, while on the right hand side, the Internet/PC ecosystem has focused on enabling developers to differentiate. The speed of evolution of these two ecosystems is worlds apart; since 2008, the number of applications for the younger iPhone and Android platforms has skyrocketed compared to those for the incumbent Symbian and Java ME platforms.”



Source: Mobile Developer Economics 2010 and Beyond. Produced by VisionMobile. Sponsored by Telefonica Developer Communities. June 2010. Licensed under Creative Commons Attribution 3.0 License. Any use or remix of this work must retain this notice.

As the graph below shows, the report also uses Developer preferences and activity as a proxy for identifying trends, on the grounds that this is quintessentially a small-business operation where the market is defined as much by the volume of innovation as by the scale of capital investment. Developers mirror the trend that in mid 2010 saw Android overtake Apple’s iOS as the platform with the most new apps.



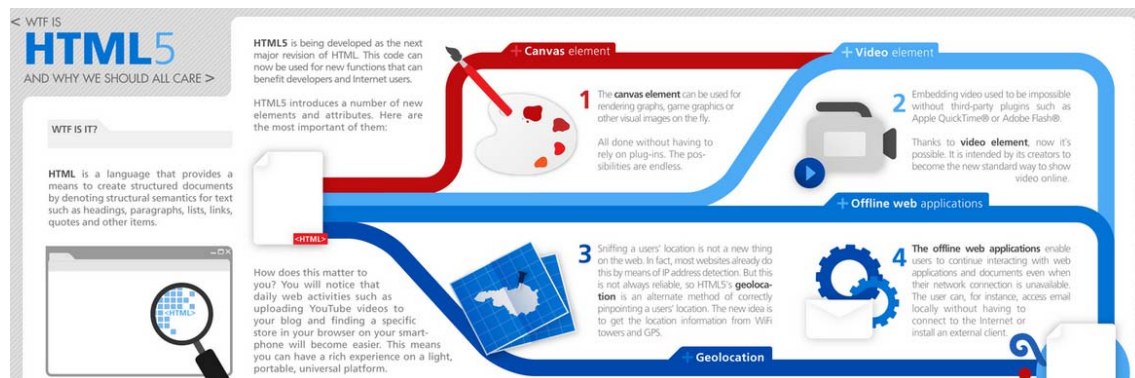
2.3 Mobile Web and m-apps

The power of these technologies is that they offer opportunities for organisations and individuals to reach, support and engage more deeply with people and organisations. However, choosing the most appropriate channels and technologies is particularly difficult in such dynamic sectors as m-agriculture. One of the key decision points is whether to produce content that can be accessed from the Web using standard browsers available on mobile digital devices or accessed using m-apps. In an excellent review of some key issues²⁹, Probhas Pokharel of www.mobileactive.org argues that content providers looking to increase the reach of their content should “produce for the mobile web not m-apps” viz.

- More phones have the ability to access web-based content than specific app-based content.
- Content on the mobile web can be served easily to many different types of mobile handsets.
- Cost of production is lower for mobile web content.
- You are free to publish anything on the web, whereas application distribution platforms sometimes tightly control what can be distributed, based on content in the app or a set of other criteria.
- Content published on the mobile web is automatically accessible through search engines and social networks, two primary ways people find content today.
- Many must-have features for mobile content distribution (location, multimedia support, offline storage) are available through new standards like HTML5, supported on many different high-end devices”.

Many support Pokharel’s position, including figures such as Robert Hamilton, Google’s Mobile Product Manager, who argues that ‘the browser will beat apps, because it is an open standard’. He believes that, “in years to come it is likely that the browser will fulfill all the functions that apps currently do”³⁰ The argument for web content is strengthened

by the new version of the universal Web page language, HTML5, which simplifies the inclusion of graphical, video and other multimedia content, as illustrated below³¹:



The W3C consortium is one of the most authoritative sources for understanding the development of the mobile web. Their magisterial 'Mobile Web for Social Development Roadmap'³² is a rich, regularly updated resource that seeks to enable readers 'to understand the current challenges of deploying development-oriented services on mobile phones, evaluate existing technologies, and identify the most promising directions to lower the barriers of developing, deploying and accessing services on mobile phones and thereby creating an enabling environment for more social-oriented services to appear'

However, Pokharel also lays out reasons to look at mobile apps over mobile websites. Some of these reasons include:

- "Mobile apps make it easier to monetize content by charging for content both easier and more culturally acceptable.
- Despite HTML5's support of many important features, some features (like hardware support) will only be available to native apps.
- Mobile apps have a better case of high user engagement, at least according to one case study of a United States-based content producer."

This last point, about engagement is based on the experience of National Public Radio's (NPR) in the United States, which is significant, given the importance of Radio as a channel and tool to support Development. "NPR has a mobile website and iPhone and Android apps for content delivery, and in their experience, the apps are used more than the corresponding mobile website. While the number of people using the iPhone app and the website are similar, app users view six times as many pages of content, and are engaged with content for longer time periods. The fact that Android and iPhones are disproportionate traffic sources compared to market share alludes to this deeper engagement as well".

The case that m-apps represent a new and different model of content consumption and digital communications is powerfully expressed in a controversial article in *Wired* magazine, "The Web Is Dead. Long Live the Internet"³³.

"You wake up and check your email on your bedside iPad — that's one app. During breakfast you browse Facebook, Twitter, and The New York Times — three more apps. On the way to the office, you listen to a podcast on your smartphone. Another app. At work, you scroll through RSS feeds in a reader and have Skype and IM conversations. More apps. At the end of the day, you come home, make

dinner while listening to Pandora, play some games on Xbox Live, and watch a movie on Netflix's streaming service.

You've spent the day on the Internet — but not on the Web. And you are not alone.

This is not a trivial distinction. Over the past few years, one of the most important shifts in the digital world has been the move from the wide-open Web to semiclosed platforms that use the Internet for transport but not the browser for display. It's driven primarily by the rise of the iPhone model of mobile computing, and it's a world Google can't crawl, one where HTML doesn't rule. And it's the world that consumers are increasingly choosing, not because they're rejecting the idea of the Web but because these dedicated platforms often just work better or fit better into their lives (the screen comes to them, they don't have to go to the screen). The fact that it's easier for companies to make money on these platforms only cements the trend. Producers and consumers agree: The Web is not the culmination of the digital revolution”.

The article triggered a massive debate, on the *Wired* site, in print and, rather ironically perhaps, on the Web. That the landscape is changing is not in doubt, well illustrated in the second version of Web2.0 Summit map of the network economy (see below):



As this map demonstrates, the debate has to be reviewed in the context of the much larger and more complex digital network economy and the forces that are shaping it. To take the example of *Facebook* and other online social networking platforms, noting in passing that there are more users of Chinese online social platforms such as *Ren Ren* than the already startlingly large 500 million users of *Facebook*: their growth and search for monetisable applications and features creates waves as large as those generated by the impact of particular application environments such as *Android*. One reason for this, and of particular relevance to m-agriculture, is the fact that Facebook is

focused on user experience as a means of getting users to increasingly support the advertising and other revenue streams required impatiently by its investors. In the same way, the m-agriculture sector will be driven by the specific context, needs, interests and media consumption patterns of farmers, fishers, intermediaries, Government extension advisors and all the other players in agriculture and rural development. Given the infrastructure, capacity and other constraints referred to above and the likely slow pace of change in many areas, the debate over mobile apps vs the mobile web is currently something of a false dichotomy but perhaps important in the longer term, as Hamilton acknowledges in his piece quoted above. In the short and medium term, however m-agriculture needs to advance in both areas, tailoring services and applications to particular audiences.

2.4 Tablets and e-books

Neither tablet computers nor e-books are new technologies but 2010 saw the entry of two new devices that in different ways are already influencing the digital content and media consumption markets.

2.4.1 Tablets

Tablet computers have been in use for over 10 years but the iPad is seen as a “game-changer” by powerful figures such as Rupert Murdoch, founder and owner of the vast and influential media company *News Corporation*. Murdoch believes “hundreds and hundreds of millions” of similar tablet computers will eventually be sold around the world and that the iPad’s convenient style could reinvigorate journalism: “We’ll have young people reading newspapers.”³⁴ John Naughton, Professor of the Public Understanding of Technology at the



Open University has a keen sense of trends in ICT and has been using an iPad since it was released in the UK in June 2010. His summary after one week of use was hardly positive. After complaining about its weight – 1.5 kilos – he concluded:

“The essence of the iPad is that it’s a good device for passive “consumption” of pre-prepared multimedia content. That’s why the old media dinosaurs are salivating about it: it seems to offer them a way of regaining control of the customer – and of ensuring that s/he pays for content. And one can understand why they are so charmingly deluded about this: all apps have to come through the iTunes store and can be charged for. No wonder Murdoch & co love the device. They think it’ll rescue them from the wild west web, where people believe that content should be free. Yeah, and pigs will also fly in close formation.

It’s when one tries to use the iPad for generating content that its deficiencies become obvious. The biggest flaw is the absence of multitasking, so you have to close one app to open another, which is a bit like going back to the world of MS-DOS. Email, using the on-screen virtual keyboard, works fine, and if you buy Apple’s text-processing app, Pages, then you can create documents. But the hoops one has to go through to pull existing documents in for editing are ludicrously convoluted and there’s no way one can easily print from the device”³⁵.

However, like many people he has continued to use the device for three main reasons.

1. The battery life at 10 hours makes it a genuine portable
2. The graphics are superb, which is important if you are a photographer but is also true in other areas such as education and training

3. There is a growing group of applications that makes it more usable, such as note taking apps that also synchronise via the web with other devices or voice dictation tools such as Dragon Dictate.

There is, of course, a lot of debate about the 'game changing' nature of the device. In many ways it is simply a much better version of older tablet computers, with Apples flair enabling them to deliver on their promise of convenience, portability and enhanced user experience. Some complain about the lack of genuine innovation in the iPad app market, with many apps simply operating as good-looking media readers³⁶. However, apps such as *FlipBoard* which integrate a users social networking connections into what becomes a social aggregator of news feeds, enriched by the iPads superb graphics, provide a glimpse of the kind of environment which could indeed have 'young people reading newspapers', tapping into the 'disintegrated, pick and choose flow of digital media' consumption³⁷ which evidence suggests is typical of those who engage mainly with online or digital media³⁸. For all its deficiencies sales are huge and growing. Gartner also predict that:

- Tablet sales will more than double in the next year, with general-purpose machines taking business from mini notebooks and single-function tablets such as Amazon's Kindle.
- The iPad will drive sales of media tablets in 2011, with 54.8 million units projected to ship worldwide compared to 19.5 million tablets this year.
- North America will account for more than half of media tablet sales this year, but as they become available elsewhere, this proportion will drop to 43 per cent by 2014.
- All-in-one tablets will cannibalize sales of e-readers, gaming devices and media players while Mini notebooks (nebooks) will suffer from the strongest cannibalization threat as media tablet average selling prices (ASPs) drop below \$300 over the next two years³⁹.

Competitors are rushing out new tablets, fearful perhaps of a repeat of the runaway success of the iPod and iPhone. For example in September 2010 RIM, the maker of the Blackberry, launched a *Playbook* tablet in direct competition with iPad. Crucially, RIM also announced a Blackberry advertising service and a payment service to allow publishers to sell content and premium services⁴⁰. RIM was following Cisco, which in June 2010 launched an Android-based 'iPad for business'. In contrast with the iPad walled garden, Cisco seeks to build on Androids openness to achieve market share. The *Cius* also 'offers telepresence interoperability, HD video streaming and real-time video, multi-party conferencing, e-mail, messaging, browsing, and the ability to produce, edit and share content stored locally or centrally in the cloud. Optional extras include an HD audio station equipped with a telephone handset speakerphone, HD DisplayPort and USB ports'⁴¹.

2.4.2 e-book

The e-book is also an older technology but the launch of the latest version of Amazon's Kindle is important, partly because it is rooted in Amazon's very successful online store (previously only books, now an online shopping mall) but also because it follows a diametrically different development path. It is light-weight, readable in sunlight, accessible over wifi or 3G,



has a good battery life (at least 5 hours), audio and Text-to-Speech capacities and above all is relatively cheap, at GBP £100 for the wifi version. This has made the Kindle a more immediately accessible tool for development purposes. www.Worldreader.org, for example, has recently (March 2010) completed a proof-of-concept for e-reader use, using 20 Kindle-brand e-readers in the village of Ayenyah, Ghana.

"During this trial, we found that the Kindle e-reader and digital books helped new readers learn to read, got the kids reading more, and gave access to hundreds of thousands of books, in less time and at lower cost than printed books."

"The infrastructure already in place for mobile phones supports e-readers: Low-power Kindles successfully charged from solar-powered car batteries in an hour, we were able to download books via the satellite internet link in 45 seconds, and there was cell phone coverage in the village."

*Project Gutenberg*⁴² alone offers 30,000 free e-book titles. So, with each e-reader the group brings to a student, it may well be justified in claiming it also brings that student "the world's library".⁴³ It's also interesting to note that the Kindle also has an MP3 player and 'an experimental browser', although at the moment it doesn't allow direct download of PDF or other document formats, requiring them to be loaded via USB.



3 Development and mobiles

As referenced in the introduction, this has become one of the most dynamic sectors in ICT4D with high profile m-application competitions and grants accompanying the rapid growth of this sub-sector of the ICT industry in Africa's centres of digital activity. The InfoDev mobile application hubs, for example, are located in Nairobi, Kenya and South Africa, already seen as beacons for Africa's new digital economy. At the same time there are small, independent start ups, such as www.masawa.org, which is focusing on Java applications for the widest range of phones. Alongside this focus on encouraging local entrepreneurial development, there are major programmes from large organisations such as Nokia and Reuters. These latter are examples of a different set of drivers for the spread of m-applications, the importance to global corporations of the now legendary Bottom of the Pyramid (BoP) markets.

3.1 Globalising M-apps

The Nokia life tools programme has been established in India for some time and only recently (November 2010) launched in Africa, starting in Nigeria⁴⁴. The Press Release

emphasises the importance of the platform in Nokia's global ambitions: "the African launch follows hot on the heels of highly successful launches over the last year in Indonesia, India and China. Today, Ovi Life Tools has over 6.3 million users globally, and the introduction of this service in Africa further extends Nokia's reach in emerging markets. Services available include:

- Healthcare services: Mother and childcare, health & fitness and disease information.
- Agriculture services: Market prices, news & advice and weather.
- Education services: Learn English, acquire general knowledge and access exam results.
- Entertainment services: Football results, music, news alerts, horoscopes and jokes."

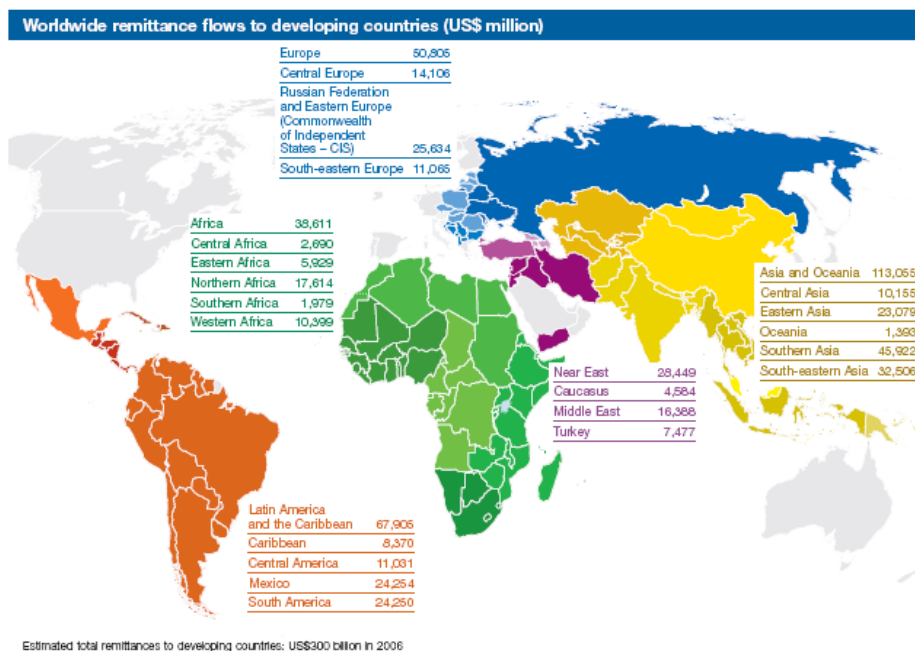
With this offer this Nokia is cross marketing the "infotainment" and the rural BoP VAS services described above. Crucially, they will be available in Hausa and pidgin-English, as well as Standard English. Nokia's strategy is to bundle services with its handsets and represents the strongest example of this alternative model to that supported by Apple, Google and development donors - the independent mobile application economy. Clearly, the financial weight and reach of Nokia will ensure the programme has impact, especially on smaller local organisations that have been developing a similar range of services, since Nokia is able to set pricing at low levels, at least in these early stages of their marketing strategy.

Reuters Market Light (RML) is a similarly disruptive intervention (especially of local initiatives) by a well capitalised global organisation seeking to penetrate new markets through BoP interventions. Originally targeting the Indian market, RML was launched in October 2007 in Maharashtra state providing personalised text messages on weather, market prices, agriculture news and crop tips. By April 2010, over 200,000 farmers in 15,000 villages across 10 states in India had subscribed to RML. As befits a global corporation, RML is large for such a specialist service: "it employs more than 300 full-time content professionals, offering news and data on more than 150 crops, 1,000 markets and 2,000 weather locations across 12 states of India. The service crossed the \$1 million sales mark in 2009. As the business model becomes established in India and as our distribution and marketing strategy matures, we expect to expand the benefit of our pioneering business to millions of farmers in India, and to other emerging markets in the near future"⁴⁵.

3.2 Contextualising m-app developments

Alongside these specific agriculture-focused initiatives, the m-agriculture sector is also influenced and driven by developments within the wider mobile application and ICT sector. Two sets of developments in particular are worth noting. The first is the spread of mobile money [m-money] services. While m-money services are extremely important in the rural economy, with immediate and far-reaching impact on all aspects of value chains and family economies, they are also a very powerful driver of improved ICT and mobile connections and services. The importance of m-money in terms of international remittances is especially strong: as many have pointed out, global remittance is in excess of \$300 billion (USD) annually which is greater than the sum of all international aid. Furthermore, in nearly 40 countries, remittance represents a share of GDP greater than 10% while between 30 to 40 per cent of remittances are sent to rural areas, where financial services are often lacking⁴⁶. Because of its strategic importance and potential profitability, companies are investing large sums of money to ensure infrastructure and human capacity are in place. Development organisations such as IFAD are drawing attention to policy and regulation constraints, supporting efforts to ensure Governments

and regulators are responding faster and more flexibly to the need for changes, as happened in Kenya with the introduction of *mPesa*.

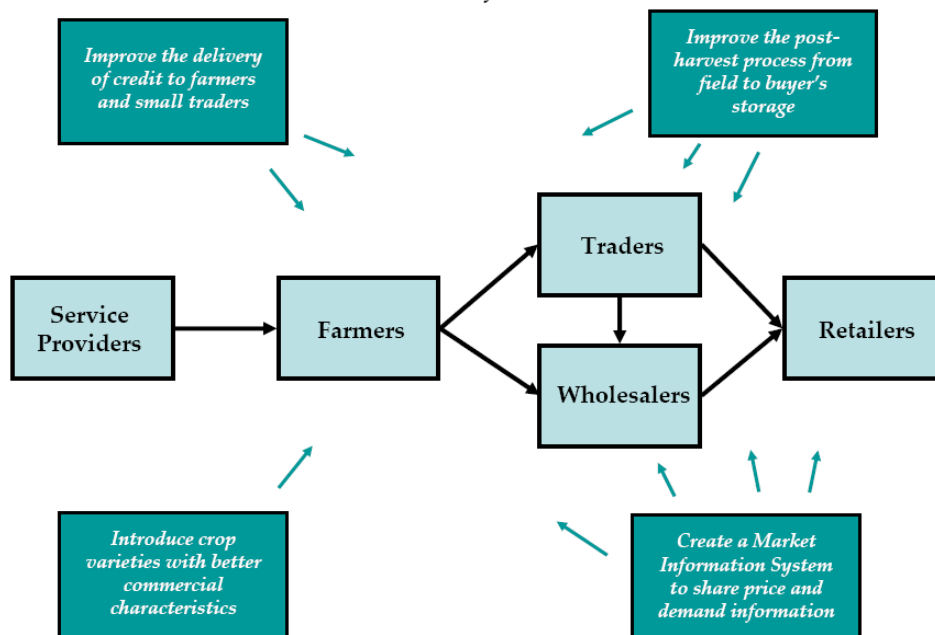


A second very different but equally powerful driver comes from the activities of civil society, notably campaigners, human rights activists and those involved in humanitarian relief. Campaigners have long been recognised as energetic early adopters of new technology and their activities do a lot to spread understanding and use of new ICT tools at community level. It was this nexus of energy and localism, driven by concern for human rights that led to the rapid development of www.Ushahidi.org during the 2008 post-election violence in Kenya. While this engagement in civil society movements is one of the main engines for the continued growth and spread of *Ushahidi*, it has also been fuelled by the humanitarian relief community who saw the value of its rare combination of SMS and Web tools in managing rapid response situations such as the recent Haiti earthquake. However, from the perspective of the development of m-agriculture, it was *Ushahidi's* roots in Kenya and the team's intimate understanding of the local ICT and connectivity economy that ensured it developed as a tool which addresses the least to the most connected, while the use of Open Standards ensured that it can be used in other parts of the world.

3.3 AIS and Value Chains

Value chain analysis has become a central tool in development agriculture and latterly approaches that combine this with innovations systems thinking, as illustrated in Appendix Two, have become more influential. There have been a number of studies of the use of ICT across value chains and this approach can be a useful tool for determining the most strategic interventions for organisations and funders. It is clear from the simple illustration below that such an approach could be adapted in the m-agriculture sector, particularly Agricultural Information Systems (AIS).

EXAMPLE 'WHOLE VALUE CHAIN' PROJECT ACTIVITIES



For example, a study by De Silva, Ratnadiwakara and Soysa suggests that “information-based transaction costs as well as other costs related to seeking this information, which are defined as “search costs” can be reduced throughout stages of the value chain”. Gains would be significant since, according to the authors, 11% of the transaction costs which make up 15% of the cost of vegetable production are search costs and “small-holders farmers are the most affected by search costs as they are fixed costs. When the search cost in different stages of the agricultural value chain is considered, the highest percentage of cost of information is incurred during the growth stage (53%), followed by the decision stage (24%) and selling stage (9%).As the majority of these costs consist of travel fares, if 50% of the trips were replaced by phone calls and SMS to retrieve information, search costs can be reduced by up to 33%. Therefore, if systems exist which allow farmers to retrieve required information at these stages along the value chain, overall production costs can be reduced significantly”⁴⁷.

The IFAD supported www.linkinglearners.net, which was working to strengthen linkages between small farmers with other key players in the market chain from producer to consumers, was an early example a project that identified and promoted the use of mobiles in East African value chains. During the 2010 Observatory we will use these approaches as a basis for mapping m-agriculture practice and developments.

4 Futures

While few would claim they can accurately predict technology futures, it is useful to look at trends which are clearly influencing developments and attempt to identify some which are likely to have an impact on m-agriculture.

4.1 Social Networking

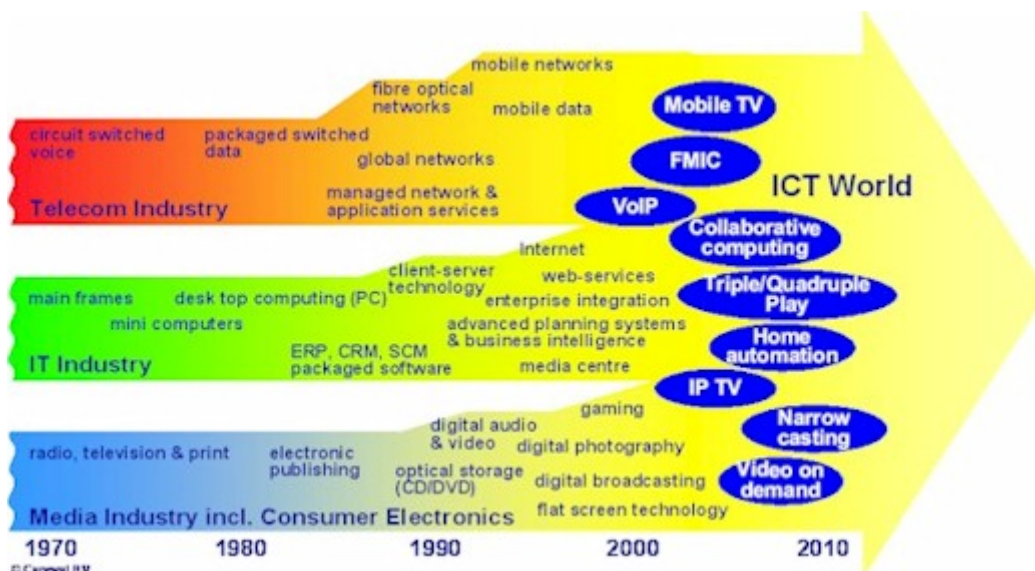
As discussed above, enabling people to use digital devices for social networking has been one of the most powerful drivers of the Internet and Digital economies and this is likely to continue. This will mean continuing growth in the larger networks and further integration of social networking functionality into m-apps. Location based tools such as

www.foursquare.com are signposts to likely developments, functionality that is likely to be added to or integrated with the larger online networks. Twitter updates are already geo-coded, so it will not be long before it is possible to know which of Facebook friends is located within, say, 500 meters. A new app, *Magitti*, currently in trials in Japan, uses location, social feeds and also a user's preferences and context to make recommendations of places near-by to go, based on personal data⁴⁸.

An interesting opportunity for advice and support services using this convergence of mobile technology and digital social networking platforms is illustrated by counselling services being developed and implemented online and/or through mobile phones. www.MxIT.com, as we described in 2009, is an influential, mobile-based social network developed in South Africa but spreading rapidly. It has been used for drugs counselling⁴⁹ as well as HIV counselling and support⁵⁰.

4.2 Convergence

A perhaps over-used word, convergence is where previously separate technologies and media are integrated, say, onto new devices. Smartphones are one of the most striking examples. Associated with this is the convergence of the telecom, IT and media industries, which is creating a large “infocom” market: Fixed Mobile Internet convergence is blurring the boundaries between traditionally separated communication and content services. Cable operators, ISPs and traditional telecom firms are increasingly in direct competition to provide “multi play” packages of fixed-line telephone service, broadband internet, television and mobile telephony. The figure below highlights the key technological developments in the telecom, IT and media industries over the past decades, now accumulating to a full convergence of these industries. In a nutshell, one may describe the Information and Communication Technology (ICT) World as the marriage between networks and computers and the so-called Infocom World as the marriage between TV broadcasting and the networked intelligent devices of the ICT world⁵¹.



The continually developing iPad ecosystem is instructive in this context. The iTunes store is the crucial element, a one-stop digital content store for music, films, magazines are a click away for the 160 million subscribers who have already registered their credit card details on the site. Apple has already declared its ambitions to move into the TV market. Its *AirPlay* wireless technology works with its new TV unit to stream video from

any iOS 4.2 device – iPad, iPhone, iPod – and from the web to a High Definition TV, making iTunes potentially the channel to all a users home entertainment⁵².

In this converging world barriers are also breaking down between previously discrete development sectors, which poses important questions to organisations working in agriculture and rural development about how they can best add value in the new contexts, especially what kind of partnerships can be built with Government and the commercial sector.

4.3 Voice

We previously described some of the early instances of voice related m-agriculture applications in 2009, drawing on the first-rate survey from www.MobileActive.org⁵⁴. The most significant development in 2010 has been the development of Google voice search, available as an m-app: you can speak your Google search queries and hear the results returned. This trend will continue to grow. You will be able to speak one language into your phone, and then push a button which will translate what you have said into another language, or you can use your voice to enter an SMS and watch as the phone translates it into text ready to be sent. This was recently integrated with Google Goggles, which enables people to take photos of text and have it translated to at least an approximation of the text. These functions are only available in a limited range of languages presently, but this will change: Google has recently introduced an m-app for Africa that returns spoken Google search results in Zulu or Afrikaans text on screen.

It is hard to overestimate the importance of these developments because they offer the promise of addressing illiteracy, one of the major constraints to equitable development in many countries.

4.4 Localism

Another major benefit of these advances in voice technology is that it delivers long awaited tools that explicitly support local languages. This is especially important given that local content and local languages are one of the most powerful demands from audience and therefore a strong and growing market. This was well illustrated by the awards declared in November 2010 United Nations based World Summit Award⁵⁵ for mobile contents & apps, many of which were to do with local content and services for a limited geographical range. “Mobile content proves to be national and quite different than online where global reach is the name of success”, said Prof. Peter A. Bruck, Chairman of the Award. This trend is particularly suitable for m-apps, since location information is available on the phone and the small outlay and support capital required for m-apps means that niche markets can be catered for relatively quickly and cheaply.

5 The 2010 Observatory

This paper is intended simply as an introduction to the issues and developments in mobile applications for use in agriculture, fisheries and rural development. During the Observatory we will be drawing on the rich experience of the participants as an aid to mapping the domain. We will be reviewing together technical developments and issues as a precursor to the final day when we will move to a discussion of the implications for stakeholder organisations and policy issues.

6 Glossary

Open Source Software	Open-source software (OSS) is computer software that is available in source code form for which the source code and certain other rights normally reserved for copyright holders are provided under a software license that permits users to study, change, and improve the software 56
Cloud computing	Cloud computing is Web-based processing, whereby shared resources, software, and information are provided to computers and other devices (such as smartphones) on demand over the Internet. http://en.wikipedia.org/wiki/Cloud_computing
ILRI	International Livestock Research Institute, part of the Consultative Group on International Agricultural Research (CGIAR) group
GPRS	General packet radio service, a packet oriented mobile data service on the 2G and 3G cellular communication systems global system for mobile communications (GSM) http://en.wikipedia.org/wiki/Gprs
Java	A computer programming language http://en.wikipedia.org/wiki/Java_(programming_language)
GPS	Global Positioning System http://en.wikipedia.org/wiki/Gps
GSM	Global System for Mobile Communications, the most popular standard for mobile telephony systems in the world http://en.wikipedia.org/wiki/Gsm
BoP	Bottom of the Pyramid, a term first used to refer to the huge numbers of people who earn very little money and thus are at the bottom of the economic pyramid. First used in the book, "The Fortune at the Bottom of the Pyramid" by CK Prahalad and Stuart L. Hart, 2004. Available on Google books at http://books.google.com.et/books?id=RPSG4JxAZzYC&pg=PR17&lpg=PR17&dq=prahalad+BoP&source=bl&ots=TTrRDki6Qo&sig=SP-Gkkr9UXPmP-dUgp6YSVAtrYE&hl=am&ei=SifqTMLhJMmWhQfh4emcDQ&sa=X&oi=book_result&ct=result&resnum=8&ved=0CEcQ6AEwBw#v=onepage&q=prahalad%20BoP&f=false
VAS	Value Added Service

7 Appendix One

Mobile applications for agriculture, collated and published in, "The innovative use of Mobile Applications in East Africa" by Sida Hellstrom

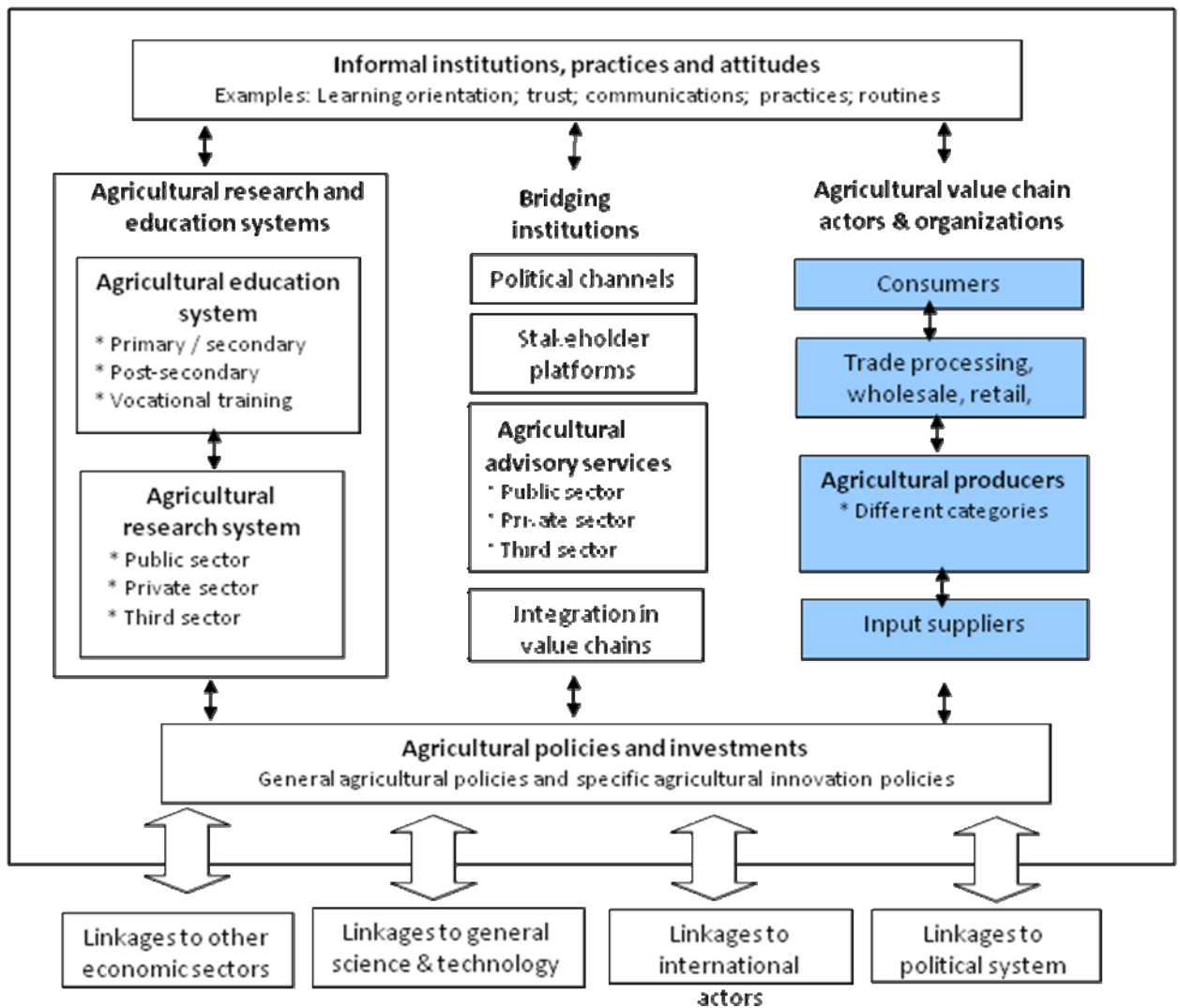
Sector	Application area	Location	Project	What?
Agriculture	Commodity Prices and Market Information	Kenya	DrumNet	Transaction platform linking small holder farmers to markets, finance and information. DrumNet partners with buyers and sellers (farmers) of produce. Stockists of farm inputs, farmer intermediary organisations, banks to provide finance. Run by Pride Africa since 2003. www.drumnet.org , ina@drumnet.org
		Kenya	SMS Sokoni	SMS Sokoni is a service that enables farmers to receive market prices in various market centres around Kenya via SMS. Run by Kenya Agricultural Commodity Exchange (KACE), which is a private initiative launched in 1997. Their aim is to link sellers and buyers of agricultural commodities and provide relevant and timely marketing information and intelligence. Works in partnership with Safaricom through their Get It 411 services. www.kacekenya.com/ www.safaricom.co.ke/index.php?id=322
		Kenya, Tanzania	Livestock Information Network and Knowledge System (LINKS)	Provides livestock prices on most major markets in Ethiopia, Kenya and Tanzania via SMS, email, World-Space radio and web. LINKS is also a market data collection tool where livestock prices and volumes are collected by market monitors. Average prices by animal kind, breed, class and grade is then calculated along with the total volumes of livestock by animal kind. The data is coded and sent into the database system using SMS or web. The project is led at the Texas AM University. http://links.tamu.edu/
		Kenya, Tanzania, Uganda	RATIN SMS	Commodity prices from various terminal markets within East Africa via SMS. Currently, the service is only available in Kenya, Uganda and Tanzania but will soon be available in Rwanda and Burundi too. Type in the commodity of interest followed by the terminal market or country, specify the currency and units of measure, e.g. MAIZE NAIROBI KSH KG. Send SMS to 8000 in Kenya, 7197 in Uganda, and 15711 in Tanzania. Premium charged. www.ratin.net/

Sector	Application area	Location	Project	What?
		Rwanda	eSoko Project	<p>A platform used to collect and distribute agricultural market price information using SMS and web. The system is built by software company BusyLab in Ghana. It allows farmers to access prices of agricultural commodities via SMS, web and in the near future via IVR (voice). In Rwanda eSoko Project is being implemented in 2010 by the eRwanda Project and Ministry of Agriculture. 3500 mobile phones will be distributed to farmers through cooperatives and at least one cooperative in every district will benefit from the project.</p> <p>www.esoko.com/, wilson.muyenzi@rita.rw</p>
		Uganda	Google Trader (Google SMS)	<p>A user-generated trading bulletin that through SMS posting and notifications matches buyers and sellers of agricultural produce and commodities as well as other products. Shortcode 6007, premium charged. Developed in partnership with MTN Uganda and AppLab.</p> <p>www.google.co.ug/mobile/sms/</p>
		Uganda	CKW Search	<p>A series of forms, presented in Java, guides the user through a menu to search for agronomic techniques for banana and coffee production. Content provided by Uganda's National Agricultural Research Organisation, Uganda Coffee Development Authority, and the International Institute for Tropical Agriculture (IITA).</p> <p>www.grameenfoundation.applab.org</p>
		Uganda	Input Supplier Directory	<p>An SMS-based keyword search service that gives the location and contact details of shops offering specific agricultural inputs, such as seeds, pesticides and fertilizer. Content provided by Uganda National Agro-input Dealer Association (UNADA).</p> <p>www.grameenfoundation.applab.org</p>
		Uganda	Agricultural Market Information System (AMIS)/Acacia II	<p>It was implemented in 2004 in western Uganda by African Highland Initiative funded by IDRC through establishing ICT-centres, telecentres and village information centres where mobile phones were used for data collection and information dissemination. Project is now handed over to the National Agricultural Advisory Services (NAADS), which is a program of the Government of Uganda put in place to increase the efficiency and effectiveness of agricultural extension service.</p> <p>www.naads.or.ug/, k.masuki@cgiar.org</p>
		Uganda	FOODNET	<p>FoodNet was launched in 1999. It covers harvest and market research information in East and Central Africa. In Uganda farmers can get prices via SMS by typing any one of the commodities BEEF, FISH, MILK, CATTLE, PORK, HONEY, HIDES, SKINS, PIGS, GOATS, EGGS and send to 198 on MTN or 755 on Zain. In partnership with Livestock Market Information Service.</p> <p>www.foodnet.cgiar.org/</p>

Sector	Application area	Location	Project	What?
		Uganda	INFOTRADE Mobile	Up-to-date agricultural prices via SMS. Type price commodity market, e.g. "price beans jinja" and send to 8555. Answer will be "Dried beans, Yellow Jinja: retail = 1500, wholesale = 1400". INFOTRADE was set up in July 2008 in a partnership venture between FIT Uganda Ltd and ASPS Danida aimed at implementing agricultural market information services in Uganda. www.infotradeuganda.com/
	Education & Awareness Good cultivation practices, improved crop varieties, pest and disease management, pest and disease management etc..	Kenya	National Agriculture Information Service (NAFIS).	Interactive voice-based service that converts text to voice providing agricultural information in English and Kiswahili. Intended to serve farmers' needs in rural areas. Run by National Agriculture and Livestock Extension Programme (NALEP) of the Ministry of Agriculture and Ministry of Livestock development. In collaboration with Teknobyte (Kenya), Speechnet Ltd, Popote Wireless, Agriculture Information Resource Centre (AIRC), University of Nairobi. Service accessible by calling 020-47NAFIS or 020-4762347 www.nafis.go.ke/ www.teknobyte.co.ke/
		Tanzania	Farm Radio International/Freedom Fone	Farm Radio International is a Canadian-based, not-for-profit organisation working with about 300 radio broadcasters in 39 African countries to fight poverty and food insecurity. They partnered with Freedom Fone to established 5 listening communities attached to 5 community radio stations in varied locations in Tanzania. www.farmradio.org/ www.freedomfone.org/
		Uganda, Rwanda	MPAIS (Marketplace for Information and Services)	MPAIS is a demand driven information and service platform that brings together demand and supply of information and services. Uses SMS to provide information to farmers and extension workers. Alive since 2005. www.mpaisuganda.com
		Uganda	Farmer's Friend (Google SMS)	A searchable database of locally relevant, organic tips and agricultural advice, plus a three day and seasonal weather forecast. Launched 2009 using shortcode 6001. Developed in partnership with MTN Uganda, AppLab and BROSDI. www.google.co.ug/mobile/sms/
		Uganda	CELAC	CELAC is a project of BROSDI (Busoga Rural Open Source and Development Initiative) that collects and exchange local agriculture content using ICT and knowledge-sharing methods to enhance poverty reduction and food security. Agriculture information collected at knowledge sharing forums is repackaged and sent once a week to farmers via SMS. Sometimes the message is read out in the village horn. The project also use mobile phones for voice conferencing (loudspeakers connected to the phone) between farmers to share information and discuss agricultural problems. When a farmer group wants a meeting they beep a BROSDI member who then phones back. The method enables direct communication and also saves on travel costs and time. Project started in 2005. www.celac.or.ug , brosdi@infocom.co.ug

Sector	Application area	Location	Project	What?
		Uganda	Question Box	<p>Question Box is an Open Mind initiative and the version implemented in Uganda is run by Apprica. Question Box is a free telephone hotline service, in local languages, where callers are connected to a call centre where an operator with access to internet and a database who can look up the question and provide the information requested. Question Box also have a network of agents in the field who have mobile phones and ask the question on behalf of the individual. The agents get compensated with free airtime. Working with the Grameen Foundation in Uganda and Uganda's National Agricultural Research Organisation, they plan to expand the service further and also include a SMS based service.</p> <p>www.questionbox.org/</p>
	Other	Uganda	Flower SMS	<p>International Trade Centre (ITC) in cooperation the Uganda Flower Exporter Association (UFEA) with technical support from CIT at Makerere University, help flower exporters closely monitor the temperature of their products at different steps in the supply chain. Temperature measurements will be taken at various spots and sent via SMS to a database. Help flower exporters yo track down the hot spots in their supply chain.</p> <p>www.intracen.org/</p>

8 Appendix Two



Endnotes

Endnotes

- ¹ Marcel Proust, novelist (1871-1922)
- ² <http://observatory2009.cta.int/pdf/Mobile-Devices-Discussion-Paper.pdf>
- ³ <http://www.grameenfoundation.applab.org/section/uganda-ag-apps>
- ⁴ <http://m4agriculture.pbworks.com>
- ⁵ <http://www.mwomen.org/Wiki/gsma-mwomen-bop-app-challenge>
- ⁶ <http://www.infodev.org/en/Project.116.html>
- ⁷ These grants have just (November 2010) been awarded. More information from a recipient, SANGONet, will be available at the 2010 Observatory
- ⁸ See http://en.wikipedia.org/wiki/Mobile_application_development
- ⁹ Strictly speaking even the basic user interface is a mobile application.
- ¹⁰ <http://www.museumoflondon.org.uk/MuseumOfLondon/Resources/app/you-are-here-app/index.html>
- ¹¹ WAP enabled phone, July 2010
- ¹² Reported by Jeremy Daniel in Memeburn, November 2010.
[http://memeburn.com/2010/11/google-how-we-think-about-mobile/?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed:+memeburncom+\(memeburn\)&utm_content=Google+UK](http://memeburn.com/2010/11/google-how-we-think-about-mobile/?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed:+memeburncom+(memeburn)&utm_content=Google+UK)
- ¹³ Mobile Developer Economics 2010, Vision Mobile,
<http://www.visionmobile.com/blog/devecon/>
- ¹⁴ <http://apps4africa.org/>
- ¹⁵ From the founder's blog, <http://greendreams.edublogs.org/2010/10/27/icow/>
- ¹⁶ Hellstrom, 2010, SIDA
<http://sidapublications.citat.se/interface/stream/mabstream.asp?filetype=1&orderlistmainid=2861&printfileid=2861&filex=3830607245054>
- ¹⁷ Strategies for the Adoption of Mobile Technologies, <http://www.ungana-afrika.org/book/strategies-adoption-mobile-technologies/diagrams>
- ¹⁸ **There are workarounds - expand**
- ¹⁹ The open development platforms built on Google's *Android* operating system, used in both mobiles and Netbooks, are clearly a potential game-changer.
<http://blog.esoko.com/2010/11/torsten-herbst-android-developer.html>
- ²⁰ "Going beyond Voice – Mobile Data Value Added Services in Pakistan", Amir Malik, Teletimes International, August 2010 <http://teletimesinternational.com/research/342/going-beyond-voice-mobile-data-value-added-services-in-pakistan-2>
- ²² Source: Qualcomm Inc. Blind primary research conducted by TNS July – Aug 2009
- ²³ VAS: Trends Changing Dynamics of the Game by Tarun Handa, VAS, SDP & Mobility Solutions, Tata Consultancy Services, Feb 2010,
<http://www.wirelessduniya.com/2010/02/18/guest-post-top-5-current-vas-trends-in-india-and-emerging-markets/>
- ²⁴ http://www.readwriteweb.com/archives/internet_founder_tim_berners-lee_details_4_concerns_about_future_of_mobile.php
- ²⁵ <http://manypossibilities.net/2010/09/so-you-think-you-can-innovate/>
- ²⁶ <http://manypossibilities.net/2010/05/facebook-zero-helps-ideas-multiply-at-the-bottom-of-the-pyramid/>
- ²⁷ Noted by a Nokia sponsored reporter for ReadWriteWeb,
http://www.readwriteweb.com/archives/internet_founder_tim_berners-lee_details_4_concerns_about_future_of_mobile.php
- ²⁸ We have drawn this summary from a rich Wikipedia entry,
http://en.wikipedia.org/wiki/Mobile_application_development
- ²⁹ <http://mobileactive.org/mobile-web-not-apps>
- ³⁰ Op cit [http://memeburn.com/2010/11/google-how-we-think-about-mobile/?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed:+memeburncom+\(memeburn\)&utm_content=Google+UK](http://memeburn.com/2010/11/google-how-we-think-about-mobile/?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed:+memeburncom+(memeburn)&utm_content=Google+UK)
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- ³³ http://www.wired.com/magazine/2010/08/ff_webrip/all/1
- ³⁴ <http://www.guardian.co.uk/media/2010/aug/05/ipad-rupert-murdoch-apple-newscorp>
- ³⁵ <http://www.guardian.co.uk/technology/2010/jun/06/ipad-apple-john-naughton>
- ³⁶ <http://www.subtraction.com/2010/10/27/my-ipad-magazine-stand> and the ensuing debate on that page and others such as <http://mturro.amplify.com/2010/10/28/khoi-vinns-beautiful-mistake/>
- ³⁷ *ibid*
- ³⁸ 'The Google Generation', by the British Library and University College London, <http://www.ucl.ac.uk/infostudies/research/ciber/downloads/ggexecutive.pdf>
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- ⁴² http://www.gutenberg.org/wiki/Main_Page
- ⁴³ Story from http://www.readwriteweb.com/archives/e-readers_help_literacy_in_ghana.php
- ⁴⁴ <http://www.marketwire.com/press-release/Nokia-launches-Ovi-Life-Tools-in-Africas-largest-mobile-market-HEX-NOK1V-1345164.htm>
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- ⁴⁸ http://www.readwriteweb.com/archives/magitti_the_future_of_location_apps_from_parc.php
- ⁴⁹ <http://mobileactive.org/how-long-have-u-been-using-drug-counselling-mxit-south-africa>
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- ⁵² From the latest edition of *Wired* magazine, from www.wired.com,
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- ⁵⁵ <http://www.wsa-mobile.org/news/wsa-mobile-winners-2010-announced-57320101109>
- ⁵⁶ http://en.wikipedia.org/wiki/Open-source_software