Innovative ways of appropriating mobile telephony in Africa

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Introduction

Growth in mobile telephony in Africa has surpassed the most optimistic predictions of operators. This is the "miracle", an undeniable success story in Africa and one that has vindicated a competitive economy which, according to the ITU, should be further encouraged[1]. From 51.4 million in 2003, the number of subscribers grew to 264.5 million in 2007 and 375 million by the end of 2008 (Africa Next[2]), seven times the growth seen in fixed telephone lines. Mobile networks can fill gaps in fixed networks by allowing access, with their cellular coverage, in areas that are otherwise not covered. The number of phones grew from 4.19 per 100 inhabitants in 2002 to 27.5 in 2007 and 32 in 2008. This is the fastest growth rate in the world: 77 per cent between 2005 and 2006, 40 per cent on average over the period 2005−2008. Since 2005, the number of mobile phones has exceeded the number of fixed line phones in all countries. Area coverage is now around 80 to 90 per cent in urban areas in most countries, and around 40 per cent on average in rural areas. There are, however, considerable inequalities, as mobile penetration rates vary considerably, from 90 phones per 100 inhabitants in Gabon or South Africa to fewer than 2 in Ethiopia [3] (ITU figures except 2008, African Telecommunication/ICT Indicators 2008).

Today, the advantages of the telephone have been shown through practice, and for all users, irrespective of their social background or geographical situation. It is a tool that is especially suited to the needs of a continent in which social life is intense and based on oral communication.

What are the different environments in which mobile telephony is used in Africa? As a tool it is not the same for everyone, it is not obtainable everywhere in the same way and its various functions are applied differently according to the particular regional contexts – the downtown district of a capital, the business districts, the informal economy neighbourhoods, the poor outer suburbs or satellite towns, and rural areas. In Africa, the uses of mobile telephony reflect the fact that access has become more democratic and has been opened up to all population groups, including those on low incomes seeking ways of minimizing expenditure. This is the area of retail and second-hand economies. On the other hand, for low-income population groups the appearance and content of telephones are not trivial issues. They have become indicators of individual identity. Use of technology is an aspect of an individual's life in society and it is simplistic to view the impact of ICTs solely in terms of cost, functionality and simplicity of interface (Cardon 2005).

By understanding the different mobile telephony environments in Africa, we should be better able to design products and services that are and/or can be adapted to users' needs. What are the tried and tested applications and what new ideas are being developed for useful new applications that will match the capacities of intended users and meet the cost-effectiveness criteria of product developers?

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1 African Telecommunication Indicators 2004.

2 A company specializing in the study of the telecommunications market in Africa.

3 Although figures may be misleading: as one individual may have more than one phone while another shares his with members of his family. See: Report in "Secteur privé et développement" N° 4 November 2009 (references in bibliography.

1 The different worlds of mobile telephony

Owing to its particular configuration, the cellular network allows access in peripheral areas lacking any other modern telecommunications infrastructure. This relative "egalitarian trend" in the communication environment is paradoxically what makes it possible to create low-cost uses both in poor urban and peripheral areas lacking fixed telephone lines and in rural areas. In town centres, which are dominated by administration and commercial activity, users tend to be much the same as those elsewhere in the world: business people, trendy younger people, managers and office workers. But the rapid rise in the use of mobile telephony reflects the fact that it is not the preserve of a privileged few. It is used by street artisans and traders, and has been adopted by farmers, who understand the advantages of a prepayment system that can be used easily by everyone, even if it remains rather expensive.

Mobile telephony in Africa illustrates one fundamental feature of the way in which the new technologies are being used: innovation comes about as much as a result of user practices as in laboratories. The talk is of "innovation through use" which Dominique Cardon defines as "technological and service innovations that come about as a result of user practices and are disseminated through the exchange networks between users" (Cardon 2005). The approach adopted by Michel de Certeau, with subtle descriptions of users' "arts of doing" and "ways of doing", has shown how ordinary people demonstrate creative abilities to invent on an everyday basis [4] of which manufacturers are unaware: they make resourceful use of makeshift solutions and short cuts in order to create a personal way into the world created by the manufacturers and to appropriate the technologies for their own use.

According to Serge Proulx, social appropriation requires that four conditions be met:

"Technical and cognitive command of the artifact; meaningful integration of the technical object in the user's everyday practice; repeated use of the technology, which opens the way to creativity; and lastly, at a more strictly collective level, social appropriation presupposes that users are adequately represented in the processes of establishing public policies and at the same time taken into account in the process of commercial and industrial innovation and production." (Breton and Proulx 2002).

[4] Michel Certeau, *L'invention du quotidien*, 1980. This strongly influenced studies of usage in France and trends in British cultural studies.

1.1 Matching a supply…

The explosive growth in mobile telephony in the developing world is linked to the advent of cheap phones selling at less than USD 20, a dynamic second-hand market, and the efforts made by the manufacturers and operators, who have been skilled at matching products and services to the demands of society as it actually is. They have employed anthropologists to acquire a better understanding of customer thinking and habits. Since 2000, they have completely changed their economic model. Instead of going for a wide profit margin with a limited user base, they have given priority to a new model based on a narrow margin based on a broader customer base and a sales policy that is adapted to lower incomes. They have extended network coverage and promoted technical innovations in order to facilitate use. The first big innovation was the introduction of prepaid systems, now used by 98 per cent of users, who buy cards for prices starting at USD 2.04 in West Africa and are thus enabled to make use of online electronic systems of credit transfer from phone to phone. It is now possible almost everywhere to transfer credit to another subscriber using an SMS for very small sums: USD 0.40 in Nigeria and Burkina Faso, or USD 0.20 in Senegal. Charging by the second is also widespread. Texting and SMS offer another easy way of sending information. In an effort to capture market share and beat the competition, operators strategically organize price-cutting campaigns to coincide with religious events such as Tabaski, Korite, Gamou, Magal, and so on (Gueye 2010).

SIM card prices have fallen considerably (USD 5.12 in Senegal for the same call credit as in 2009). In Dakar, Bamako or Yaoundé, it is possible to find telephones that can take two SIM cards, allowing the user to take advantage of different rates applied by different operators who charge more for connections outside their own networks. With certain brands, more than one directory is supplied to allow shared use.

In Kenya, the operator has developed a service that allows the user to call someone and make the phone ring long enough for the addressee to know he must return the call, a way of getting the addressee to call rather than calling oneself. The built-in pocket lamp is another example of a product that has been developed through a customer-centred approach.

1.2 …to users' "ways of doing"

In actual fact, it is the local context that determines the way in which the telephone is used, and all manner of stratagems are applied to minimize the cost of communications - beeping someone, pooling, making use of SMS in preference to calls, using more than one chip or device – but also to allow the users to identify themselves and help one another. These methods make use of forms of social organization built around multiple social networks. In West Africa and Senegal in particular, in a "cluster" society as it has been called by Emmanuel Seyni Ndione, [5] networks are proliferating and can be activated as they are needed. This operates at every level, financial, emotional, and so on. Each individual is encouraged to be productive and seek ways of contributing to the network, which in turn helps and supports its members.

One example of such practices is the widespread use in Africa of "beeping" or "flashing" whereby a call is made solely in order to make the addressee's phone ring, without waiting for a reply or even expecting one. One retailer selling credit in Mali explained that "beeping" was like tapping someone on the shoulder just to remind him you are friends (Pelckmans

[5] Enda Graf Sahel: Une Afrique s'invente….

2009). In Mali, Senegal or Burkina Faso, a beep sent to someone who is financially better off is often not just a mark of friendship but a request to be called back and thereby avoid the cost of the call.

Similarly, **the practice of transferring telephone credit is simply a continuation of the traditional and long-established practice of transferring money by phone which is founded on notions of trust and mutual assistance.** The practice has grown naturally through mobile phones even before operators have had time to create special procedures for such services. All that is required is to entrust a sum of money to someone known to you and ask him to get one of his business contacts or acquaintances to transfer the sum to someone at a specific place, either for free or in return for payment. This is the method used by migrant workers to send money to their families without going through companies like Western Union, which charge high rates. In addition, telephone credit can be used to send cash to someone in a way that is far faster and more reliable than entrusting money to travellers.

Buying a phone and making it work puts a strain on budgets, and this has prompted some people to **band together in order to buy phones and obtain better rates.** At one of Khartoum's universities, students have set up a "*tontine"* scheme that allows members to set aside money and obtain the sum they need to buy a phone (Brinkman et al. 2009). In Burkina Faso, pools are formed by professionals to force the price down.

The pool is based on the fact that in general, the communications network of economic agents is known. It may comprise actors involved in related activities (salespeople, for example), employees of the same ministry (for example, the Ministry of Health of Burkina Faso), or of a private company. These networks are then formally established and propose to a mobile telephone operator a minimum number of members, who are to have the opportunity of communicating among themselves on an unlimited calls basis. Each member pays a fixed monthly price of between USD 10.24 and USD 20.48. Members have a real incentive to choose these networks, as if they were obliged to pay the current standard rates of (for example) USD 18, they would have only 50 minutes worth of calls. The mobile operator benefits from economies of scale due to the interconnectivity between individuals in a group of a given size. In general, there is a minimum size of network below which it is not viable from the operator's point of view. Thus once the fixed monthly charge is established (on the basis of the original number of members), it will not change as new members come into the group, so that the operator's profits increase (Kabore 2010).

Phone sharing is common in villages where individual ownership is still rare. Serigne Mansour Tall has studied the communal use of portable phones in the village of Gade Kébé (population: 150) in the Louga region of Senegal. The portable phone owned by a woman whose husband has emigrated to Italy is not just the "receiving point for domestic calls for all the villagers" but also a means for disseminating information on ceremonies and a tool for young girls looking for employment in someone's home, or for traders established in the village. Thus, while the use of mobile phones is very widespread in Senegal and indeed more or less everywhere else in Africa, social relationships are fashioned in such a way that communal forms of use continue, even if individual use now predominates (Tall 2002).

Having more than one telephone or SIM card allows people to take advantage of the different deals on offer from different

operators, bonuses for certain events or times, preferential rates, and so on.

Another widely used method of minimizing costs is to send text messages using the short message service (SMS) or texting. Here practice in Africa tends to be similar to that seen in more developed countries.

One study by Moustapha Ndiaye on telephone use in Senegal's third city Thiès and in the French city of Rennes in 2007 and 2008 shows that the most used functions differ according to users' age. As in Europe, messaging is used more by young people under the age of 25 years, those over that age tending to prefer voice calls. For the youngest users, choosing to send text messages in preference to voice calls follows from their lower purchasing power. One SMS message costs USD 0.02 in Senegal today. In addition, the tendency among younger users to use messaging while older users prefer voice calls is also partly due to their greater adaptability. In Africa as elsewhere, portable phones make it possible to establish links with peer group members outside the family. This process of opening up to the world outside the family is also drawing in new values that together create a "generational identity", and young people are making their own distinctive mark on mobile telephony (Ndiaye 2008).

But SMS use is far from confined to the younger age group. It is paradoxically used even by people who are illiterate in order to save money. One surprising example in a "society based on the oral tradition" is cited by Ludovic Kibora in connection with Burkina Faso. He notes that the process of circulating information by word of mouth appears to have been largely superseded by SMS messages. A wedding invitation, death announcement, or simple greetings, are now being sent by SMS, as it would be inconceivable in terms of cohesion within a given social group not to pass on a piece of information, and it is here that the SMS plays a key role in the rural and urban environments.

"A young bush nurse in Santidougou, a village about 35 kilometres from Burkina Faso's second city, in an area where the cellular signal is intermittent, informs us that he has found a tree from the top of which he has been able to send and receive SMS messages. Before starting work at 7 in the morning, he would climb the tree to send off or receive messages. He did this as often as necessary. Villagers would regularly give him their prepaid cards and ask him to send SMS messages for them. Such examples abound in the villages of Burkina Faso." (Kibora 2009).

Young public officials act as public "digital scribes" or intermediaries in order to read the messages. It is not, however, essential to fully master writing; the key thing is to make oneself understood. Kibora cites the example of a commonly used message at the critical time in arranging a marriage, "*PPS de fati samdi o vilag*". The abbreviation PPS, which stands for a greeting to the woman, has been taken and developed by young people in the capital and spread to the populated areas of Moré.

According to Norbert Ouendji, "in Cameroon, the Short Message Service is used by a substantial number of people and has been a habit among consumers since the end of 2000. Some 38.5 million SMS were sent in 2003. That number has grown spectacularly with every passing

spring and passed the 500 million mark in 2008" (Ouendji 2010).

This preference for using SMS is being exploited by those involved in development, as we shall see later on.

On the other hand, and unlike what happens in Europe, voice messaging is little used in Africa as it presents a problem in a society where one does not talk to a machine, and a financial one given the general reluctance of people to pay for calls when the intended correspondent is not available (Garron 2008).

The telephone has become an integral part of the people's lives, one which in the words of a Sudanese saying "eats and drinks with me" (Brinkman et al. 2009). Moustapha Ndiaye, in his study on the uses of mobile telephony in Thiès, Senegal's second city, shows how the device becomes an expression of the individual's identity especially its external aspects. The individual's identity is reflected in the choice of phone brand, its colour, size, idle display and ring tones. Women are said to be especially sensitive to this and change the phone as often as possible. For example, the idle display will sometime display an image of users' favourite performers, their home region, the symbol of a group to which they belong, or their beliefs (Ndiaye 2008).
The variable "means of acquisition" also has a particular connotation in the context of the appropriation of mobile telephony. In the case of a phone obtained through an acquaintance living and working abroad (80 per cent of the cases studied by Ndiaye), the phone shows that the user is a relation, friend, partner or spouse of a Senegalese citizen living abroad. In the case of a portable phone purchased by an individual with his or her own resources, the phone is a statement of the owner's social status.

Prepaid card sellers in Dakar, September 2007

Isabelle Garron[6] in her studies on *Usages du téléphone mobile en Afrique subsaharienne au Congo* has shown how music, which is omnipresent in the city and in Congolese life, is exchanged mainly from computer to phone and from phone to phone (using Bluetooth). The mobile phone is a tool for music professionals and a platform for activities shared by professionals, the public and places of transaction. Music and video files express contents, codes, and modes of self-affirmation. Ring tones express a sense of belonging and provide a medium for promoting artists. In Brazzaville residents of a district which is also home to a musical band help to support their band using their phone ring tones. "In Ouenzé, a neighbourhood in the north of Brazzaville, you can hear Extra Musica Zangul and Z1 international, while in Bacongo and Makélékélé you can hear Rapha Bounzéki…" (Garron 2008).

The telephone has become indispensible. It is so much a part of everyday life and culture that it has been totally "domesticated" (de Bruijn et al. 2009). Clearly, the mobile phone is more than merely a means of calling or sending messages, photos, music and phone numbers. It also expresses the relative importance and style of the user (Pilaf 2009).

1.3 …which is creating a new, largely informal economy

The new information and communication technologies are a major factor behind the expansion of the private sector in Africa. In 2007, the mobile telephone sector employed, directly or indirectly, more than 3.5 million people in sub-Saharan Africa (ITU 2009)[7].

The case of the expansion of call centres thanks to the explosive growth in mobile telephony is emblematic of this new ICT-based economy. The banking sector in Africa, and especially in Nigeria and Kenya, is for the first time trying out call centres. It is interesting to note why this expansion is taking place now, whereas banks in South Africa and elsewhere went through this revolution ten/fifteen years ago, as Dave Paulding has noted [8]. Nigeria and Kenya are growing and relatively stable economies, but another major factor is the fact that African consumers are more connected. They are looking for new ways of contacting their banks rather than going to branch offices. The explosion in mobile telephony has led to a rapid growth in demand for contact with network operators. Customers have grown accustomed to connecting with their cell phone operator by phone and demand the same level of sophistication in other services such as banking. In general, once the call centre is set up and running, the number of employees will grow in line with the demand for its services (Paulding 2010).

Most of the jobs created, however, are not registered jobs but part of the huge informal economy which accounts for at least 60 per cent of GDP in Africa[9].

[6] Telecom Paris researcher has shown that music is omnipresent in the city and the life in general, and is an emblem of Congolese culture.

[7] ITU: Connect Africa: Investing in Africa's progress, Vol. II, Jan. 2009. p.12.

[8] Regional Sales Director for the UK, Middle East and Africa, Interactive Intelligence Inc.

[9] The notion of the informal sector, a term coined by Keith Hart in 1973, showed empirically one dimension of a phenomenon that would acquire considerable significance in developing countries. Lautier, De Miras and Morice defined the informal economy as the set of all economic activities not covered by legal standards with regard to taxation, social security, legal aspects and statistics. [Lautier, De Miras, Morice 1991].

Surveys in Burkina Faso, Cameroon and Senegal have shown that telecommunications make up the core of all activities generated in the informal sector of concern to the ICTs. Large foreign enterprises that have invested in mobile telephony have applied outsourcing and subcontracting strategies with regard to their services in the quest for greater flexibility that will reduce labour costs and pass on the cost of fluctuations in demand. The effect of subcontracting has been to encourage informal employment. Job opportunities have been created in response to the need for small neighbourhood retail services for users. From import of products to itinerant street traders, an entire range of new service activities is growing up and making its mark on the urban landscape (Chéneau-Loquay 2008).

Mobile telephony generates all manner of commerce in new or second-hand products. The major African retailers travel between Europe, Asia and the redistribution centres of Dubai and Lagos, where African products and capital are recycled[10].

Telephone companies have subcontracted the sale of prepaid cards to wholesalers and semi-wholesalers with their own resale networks, who deploy armies of youngsters in the streets of the major towns. Of the profit margin of about 10 per cent granted by some operators on these cards, the street seller may get 6 per cent, and some operators who had been paying less than that have been forced to increase their rates because sellers refused to sell their cards[11].

Hundreds of young people find **work in selling, repairing, reprogramming and charging portable phones.** They are generally not people who have studied telecommunications engineering but retrained sales people who take advantage of their previous experience in sales and using phones. One article in *Le Monde* describes this form of activity in Bamako.

"Armed with a toothbrush or soldering iron and working by the light of a homemade lamp… an artisan restores a defective mobile phone to life. Cost: " CFAF 5 000 (7.50 euros) for a basic model, three times that for a top of the range model", explains Vieux, the boss. Business is flourishing, the customers come in droves. In front of the shop, a young man is proudly showing off his new iPhone to a girl" (Abbiateci and Sabot 2010).

In one neighborhood close to the port of Dakar, which has seen a proliferation in small retail businesses that depend on mobile telephony, we find a striking illustration of an area where formal and informal economies come into contact. Ten years ago, some 102 small shops of four square metres with display cases in front opened here to sell mobile phones of all brands as well as accessories.

In 2000, according to ILO estimates, the informal sector in French-speaking Africa absorbed 61 per cent of the urban work force and was probably the source of more than 93 per cent of new jobs created during the 1990s.

[10] This trade has not, however, been studied.

[11] http://africascopie.blog.lemonde.fr/2009/10/24/quand-le-vendeur-de-cartes-detrone-le-marchant-de-cigarettes/.

They have set up right next to a modern building housing the offices of the mobile phone operator in order to attract the latter's customers. The operator filed a complaint against the shop owners, but in the end was forced to relocate its own sales and subscription activities at the end of 2006. Our own research has shown[12] (interviews with 10 employers and 30 sales employees in 2009) that such shops are generally let for between USD 61.45 and USD 71.69 per month. A fee is also paid to the local authority (from USD 4.09 to USD 6.14 a month); these are therefore legal enterprises which, however, operate in an informal way. An employer rents the shop and employs up to three salespeople who sell the phones in the street or bring customers back to the shop. Prices vary according to the model, from USD 51.20 for the cheapest to USD 1'230 for the most sophisticated models. Employers and sellers are generally linked by kinship, and profits are shared out by the employer in the light of the day's takings; there is no written contract and rates are not fixed in advance.

All brands of new and second-hand phones arriving in containers at the port of Dakar or at airports in the luggage of salesmen and others are reprogrammed by local IT people. These recycled phones are to be found everywhere.

Another service activity is illustrated by the case of the owners of small street stands where mobile phones can be rented. They are becoming ever more common in Abidjan, Libreville and Yaoundé, where fixed telephone line phone centres are rare, but not found in Dakar. The crude stand set up on the pavement offers a range of phones which can be used to make calls at rates lower than you will pay with your own phone. This is possible in Abidjan, where two of the three existing private mobile companies offer preferential rates for their big customers who pass this on to their employees. The phones are then entrusted to a relation who has the job of selling at different locations at different times of day: in the centre at morning rush hour, at the major entry points for commuters, bus stations, taxi ranks, etc., and at the close of the business day. This practice of using cell phone sales points generates an informal activity that is neither authorized nor prohibited, alongside the multitude of other such activities. Mobile telephony thus occupies the public space in an anarchic way: streets, pavements, squares, crossroads, parks and gardens, markets, bus stations. It joins the multitude of small kiosks selling prepaid cards and leads to even greater congestion of public spaces (Gnamien 2002).

In Cameroon, a different system of phone sales points is used. Walter Gam Nkwi describes the operation of the phone sales points economy in the case of the medium-sized city of Bué in Cameroon. This is not, as in Côte d'Ivoire, an informal activity; it is registered, if not actually controlled. The key actor is a telephone operator. Once someone has found a suitable location for use as a phone sales point, he or she then has to negotiate with a carpenter to make a cabin or box before registering with the Bué urban authorities. Once that has been done, the would-be trader contacts an operator directly, or the authorized wholesaler acting as the latter's agent. The trader then obtains an "electronic voucher distribution" (EVD), a special SIM card, and call credits for use by customers to make calls and transfer credit. This distribution system has created a highly competitive system of sales points in which people fight to remain in business from one day to the next. The sales points themselves are not all of the same type. Some are more lucrative than others owing to greater capital for investment and more potential customers. The city has about 500 such phone sales points. Of the 200 kiosks covered by the survey, some 150 were run by women, 50 by men, and there were differences between the sexes

[12] Individual inquiries.

in terms of the amount of credit that could be obtained. The activity can be lucrative but the competition is intense and there is a trend towards creating bigger kiosks with people in possession of capital to invest. One example is that of Elvis, which is able to buy up sufficient credit. It makes profits in three ways: If it buys up a lot of credit, it gets a bonus: USD 49.15 in credit means a bonus of USD 26.62, part of which is passed on to the customers. Call length is also a factor: for 0 to 59 seconds the rate is USD 0.20 but a further USD 0.40 even for an extra second after that. It also undertakes credit transfer – the cost of transferring CFAF 1'000 is CFAF 100, for CFAF 2'000 it will be CFAF 300, and so on (Nkwi 2009).

ICTs have now become features of the urban scene even down to small towns, with kiosks sporting the livery of the operator and a plethora of advertising posters, as we see in the Democratic Republic of Congo.

Recharging mobile phones is a problem in areas without mains electricity. There again, a multitude of small-scale money-making activities have been created. Kalsaka, a rural community of 9 000 inhabitants in the province of Passoré, situated 145 km from Ouagadougou in northern Burkina Faso, has undergone rapid economic growth as a result of a new gold mine which opened in 2007, with some 150 people in full-time employment. This has created a demand for phone charging.

Two methods are used – one involving a generator, the other relying on a solar power collector. On market days (every third day), users flock to the recharging point to recharge their mobile phones. To avoid the risk of losing so valuable an item as a phone, they wait while charging takes place and pay between USD 0.20 and USD 0.30. Charging time with a generator is two hours at most, and at least four hours using a solar unit. That difference is reflected in the turnovers of the three operators. The operator using a generator can charge almost 300 portable phones a day on market days and 125 on a normal day, earning USD 790 a month. The other two operators by contrast can manage no more than 50 mobiles a day on average and make up to USD 310 a month (Kabore 2010).

A shop front

1.4 What impact?

There have been few studies on the current use of mobile phones and its impact in sub-Saharan Africa[13]. Most of the available literature is based on media or NGO reports and focuses on "M4D" (mobile for development) projects and applications. Nevertheless a number of exploratory surveys in agriculture and fishing and on small enterprises in the informal sector have given some indication of the far-reaching changes brought about by the mobile phone in Africa.

1.4.1 In rural areas, telephone communications are leading to far-reaching changes

The way of life of millions of people in developing countries depends to a large extent on agriculture and small enterprises. The agricultural sector represents 60 per cent of the work force in most African economies, some 20 per cent of all exports, and 17 per cent of GDP; it helps to sustain 70 per cent of the population (ACACIA 2006). A recent World Bank report (World Bank 2009) suggests that the portable telephone is the best means for creating economic opportunities and obtaining essential services for millions of people, and that in the next few years most new users connecting to a mobile network will come from rural areas in developing countries, who will join the 3 billion existing users in those countries.

In the rural areas, only 7 per cent of homes possess a telephone and 40 per cent on average are out of reach of a cellular network signal, even if coverage has expanded considerably (ITU 2008). Using a mobile phone is in itself an innovation for everyone, but especially for populations (most of them in rural areas) that have never before made a phone call.

[13] See study by Proparco: *« La téléphonie mobile dans les pays en développement: quels impacts économiques et sociaux? »*

In 2000, telephone communications in one village in Burkina Faso (Nyamba 2000) relied on the nearest community telephone centre that was then about to be commissioned – a strange and potentially disruptive novelty that had to be carefully located and a manager found. Ten years down the road, telephony has gone mobile and individual, and a number of the villagers will certainly have their own personal mobile phone. The list of changes that are likely among the Sanan as a result of the telephone is a long one, according to André Nyamba, and the unique characteristics of this population, with its strong oral tradition, will change as it absorbs new content and changes form. The Sanan will have their own telephone culture but they will have helped to create it on the basis of their own culture and traditions.

Oral communication is at the heart of the way in which traditional societies throughout Africa operate, whether in the Soninké region in Mali (Steck and Soumare 2009), the Sanan of Burkina Faso (Nyamba 2000), or villagers in Uganda (Martin, Abbot 2010); mobile telephony is very much in tune with this prevailing oral tradition, which Benjamin Steck views as being boosted and turned to advantage by the immediate access these societies now have to global developments and the wider world. The tool is easy to appropriate and use and is becoming a commonplace, but the sudden advent of this technology from outside is causing profound changes in the individual's relationships with others, with space and time, in the system of moving people and goods, and in the exchange of ideas and information in these regions concerned.

The telephone transforms the effect of the spoken word. It now becomes action and transforms the world (Steck). Telephone communication has arrived among the Sanan and will change many habits and aspects of behaviour. At the level of the individual, according to André Nyamba, it

will entail a redefinition of the notion of the individual, and of his or her role and position in different structures as they are rebuilt, including the family and the village. All this will be the result of a kind of new acquired power – the obligation to inform and to be informed.

This is disrupting social hierarchies. The older generation may find itself losing their control over discourse which, once public, is now increasingly private. Its power may be enhanced if controls the means of paying for the telephone, but that power can also be challenged by younger people more adept at exploiting its various functions, and by a loss of control over them and over women, who are now enabled to communicate in a way that breaks through social constraints.

Telephones also alter the image of the outside world and the relationship with time and distance. For example, no one will now embark on the process of emigration without obtaining information in advance. The advent of the telephone in these villages gives added impetus to the general process of opening up to the outside. In the view of Benjamin Steck, distance is a fundamental notion which links us to others and constructs our identity in relation to space. It is now being extended to embrace the entire world, while time is running ever faster, with important consequences. The village will no longer be the microcosm of society with its established times and rhythms in which you take the time to go and say hello to neighbours every day. The telephone means responding rapidly. The time factor will mean a speeding up in family relationships and lineage while, paradoxically, restricting their expression in terms of time and frequency; "questions such as "why didn't you call me" will become both new and current within the group because there will always be a desire to maintain these relationships, whereas the question would not even have been asked before" (Nyamba 2000).

An instantaneous link is created with the outside world, with people in the neighbouring villages and those who have migrated to the city. More frequent communication with those who have left helps to reinforce territorial identity, which no longer depends for its preservation on close proximity but on continuity. The umbilical cord remains in place, news can circulate, but financial pressures on migrants also increase.

The telephone also tends to accelerate trade and financial flows. Improved access to information means among other things improved knowledge of urban markets and has a positive impact on production systems (Aker 2008, Soumare, Steck 2009).

One study on the spread and impact of mobile phone use in small and medium-sized agricultural enterprises was conducted in 2009 in Kumuli district, in Uganda, where 42 per cent of agricultural households have a mobile phone (Martin and Abbott 2010). Interviews were conducted with 110 farmers - 56 men and 54 women, chosen on the basis of their different agricultural activities (91) and non-agricultural activities (19). The results showed that more than half of the respondents use their mobile phones to arrange the delivery of supplies, obtain market information and negotiate prices for their products, make financial transactions and respond to emergencies as they arise. A little less than half of those interviewed consulted experts using their mobile phones.

Men have been quicker to adopt mobile phones than women, and people with more years of formal education are more likely to use the short message service (SMS) than others. About one quarter of the interviewees use both voice calls and the text message service, with more men than women using that service (16 per cent compared to 11 per cent). Men and women make equal use of SMS for

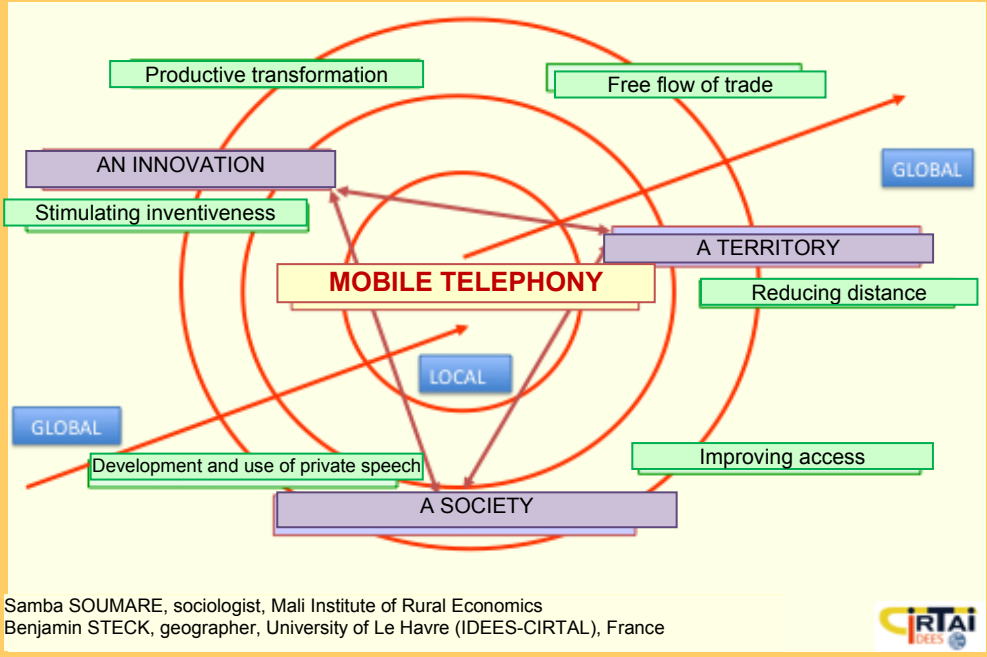
communicating with their families, but texting is generally used when the user has little credit left, and the principal means of communication is by voice.

The Uganda study highlights another aspect of mobile phone use in rural areas – use for collective purposes. Members of agrarian collectives use their mobile phones for a wide range of purposes. The study noted a number of uses such as taking photos of agricultural events, using the loudspeaker function to enable a group of farmers to consult an expert, recording announcements and contributions in connection with loan repayments, storage of data such as hens' laying dates, calendars, calculator, and so on. In this particular area, the spread of mobile phones is such that it has now gone beyond the initial phase of mainly first-time adoption, and is now at the stage of rapid "take off" in the curve described by Rogers. According to Rogers (2003), those who are first to adopt innovations are people with highly developed social relations, who travel and are exposed to ideas and opportunities that go beyond their local social systems. Women are traditionally less mobile than men as a result of prevailing social norms, under which they bear responsibility for domestic tasks and raising children. Since they are less in contact with outside sources of information, they are less likely to be among early adopters of innovations (Martin and Abbot 2010).

However, all the existing studies and observations suggest that the primary use of the telephone in rural areas is to gain valuable time in obtaining health care services. The phone can be used to report a case of illness and call an ambulance or other means of transport to get the patient to a hospital.

This can all be summarized with reference to the scheme used by Steck and Soumare based on the "society – innovation – territory" triangle, which places mobile telephony in an overall system of interrelationships between the global and the local.

Mobile telephony in a global system of development and marketing



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Source : Presentation to the Netsuds Symposium 2009, Centre d'études d'Afrique noire (CEAN-CNRS), Bordeaux, France, 13-16 October 2009

They highlight the fact that the logic of the system for circulating information overlaps with the territorial system. Distance is reduced but not eliminated, access to transport and services is improved and production transformed. The telephone stimulates inventiveness, for example in solving the persistent problem of recharging batteries. In Sarakollé villages, where there is no mains electricity supply, they use moped engines and in doing so create another source of income. More freedom in trade has benefits for the life of the community, but the broadening of horizons it brings about also creates processes of social fragmentation, despite a strong historical identity.

1.4.2 Streamlining the fishing sector in Senegal

The use of mobile telephones in the small-scale fishing sector in Senegal has led to even more obvious improvements in working conditions, work practices and incomes, than in agriculture. With improved management of sea and land traffic, meaning fewer and more efficient trips, time savings with more rapid transactions, and improved safety in a hazardous occupation, the telephone makes it possible to streamline the fishing sector at all levels.

The fishing sector is one of the most important sectors of the Senegalese economy. It accounted for some 600'000 jobs in 2006, a total turnover of more than CFAF 225 billion (over USD 460 million[14]), total exports valued at CFAF 181 billion (USD 370.4 million), or 30 per cent of all export revenues, and 22.5 per cent of total GDP. Fishing in Senegal has remained a largely traditional small-scale activity carried on by particular ethnic groups (especially the Lébous, Wolofs and Niominkas) and also largely a family activity, in which crews are often made up of members of a single family.

It has become rare for people working in this sector, whether fishers, wholesalers, fish processors, or transporters, not to have a mobile phone, in some cases one with two chips[15]. Quality and extent of network coverage are somewhat problematic. Officially, the latest beacons at sea allow capture of a signal 30 kilometres from the coast; some fishers, however, believe the range is far smaller and inadequate, since the deterioration in the fishing grounds forces them to go much further and for longer periods. They would like to be able to use these tools in all conditions. The network problem has led to some original solutions. Some fishers use their mobile phones as a GPS: since the network is located some 20 kilometres from the coast, they can use it to estimate their location. It is not possible to give an average budget for mobile phones. A chip costs CFAF 2'500 (USD 5.11) and the portable phones come at all prices. The amount spent on communications varies from one occupation to another, from one individual to another, from between CFAF 30'000 and 50 000 a month up to CFAF 300'000 for some large wholesalers.

The portable phone can be used in a variety of ways. It offers some way of ensuring greater safety in that it can sometimes (when conditions permit) be used to contact fishers at sea. Fishers can report problems, or the fact that they have been obliged to put in at different quay to sell their catch or because they have had an accident. The portable phone can also serve as a makeshift GPS system.

[14] CFAF 1 = USD 0.00204713,
USD 1 = CFAF 488 489 (rate of exchange as at 19 April 2010).

[15] All of the 27 people interviewed in the exploratory qualitative inquiry conducted between April and June 2007 possessed one. See *Les TIC et le développement de la pêche au Sénégal*, rapport de stage 2007, Guillaume Pierné, Netsuds network.

The system enables fishers to provide wholesale dealers with information on the size of their catch and the price they are seeking, and enables the wholesalers to do the same with their contacts further upstream. Many negotiations are conducted by telephone, and it is quite common for a boat to put in at a port with all the subsequent stages in getting the catch from the boat to the shop already planned. Phones can also be used to obtain information on different ports of disembarkation. Lastly, it allows constant contact to be maintained, if the network permits, and to agree on logistical issues or meeting points.

One fisher, when asked if he thought his portable phone helped him to earn more money, gave this answer:

"Of course it does. I earn more than I did before I bought this phone and I have fewer problems. The wholesalers are informed of my arrival, so I don't go out of my way for nothing, and the catch remains fresh. Most people have a portable nowadays. When I have a good contact, I pass on the number to my friends, and they do the same for me. The phone does cost a lot but really, how did we manage before?"

One wholesaler gives a good summary of the situation. For him, the telephone (and GPS) is an excellent tool at every level in the chain. It enables the fisher, whose interests were often ignored in the past, to get a good price from the wholesaler for his catch. It also makes it possible to fix the price before landing, thereby speeding up the sale at a better price. And then there is the improvement in terms of logistics. For the wholesalers, knowing in advance what is to be landed also has many benefits, as it allows them to anticipate and speculate. There is no longer a problem with funds (the inability to pay on landing because the exact price was not known), or with chains. The telephone really does offer people involved in this occupation a change for the better.

Within the sector, the fish processors make less use of the phone for business. One noted that the work involved "taking the fish and turning it into other produce. My portable is just used for making the calls I need to make and to call my husband, who is a fisherman, when he is late getting back from his work."

ICTs, including the Internet, provide a very good means of channelling goods for export. Some fishers themselves make use of the Internet. Contacts are made on the web and then developed by telephone. The advantages of doing this for the wholesalers are enormous, and even more so for the fishers, who are more often than not sure of being able to sell their catch at a good price when they find a foreign customer. This advantage has to be seen in the overall context. The fishing sector today is one in which demand far outstrips supply, and fishers and wholesalers are often able to sell their entire catch and, most importantly at a good price, to factory reps.

ICTs, and especially the mobile telephone, are bringing about real changes in the fishing sector. They help to improve safety in a hazardous sector, and are enabling those involved in it to be more efficient in a way that to some extent compensates for the gradual exhaustion of the sea's resources[16]. They also open up the sector to more effective competition by allowing general access to information on prices at a given port, the most sought-after

[16] Which may in its own way contribute to the exhaustion of stocks but there was no agreement on this among our interlocutors.

species, and so forth. ICTs provide links between the different players. They open the fishing sector in Senegal to a wider globalization by enabling those involved in the sector to export more easily and to break into more lucrative markets.

1.4.3 Benefits for small and medium-sized enterprises in Tanzania

A survey of small and medium-sized enterprises (SMEs) in Tanzania tends to confirm the findings of those on fishing or agriculture in West Africa. The mobile phone improves time and distance management and has a positive economic impact on production and trade both upstream and downstream.

Simon Rwekiza Melchioly and Oystein Sæbo in 2008 carried out a qualitative exploratory study on the nature of mobile phone use in small and medium-sized enterprises in Morogoro in Tanzania. A total of 30 interviews were conducted with owners/directors of 15 such enterprises of different categories (five carpenters, five metalwork artisans and five wood engravers).

The mobile phone is used more often than other means by all these small-scale craftsmen as a means of keeping contacts and making new ones with suppliers and customers, and more easily and quickly than was possible before, either by voice calls or by using SMS. The possibility of obtaining information on the latest prices in different markets makes for greater transparency and more favourable prices. Small entrepreneurs are now accustomed to comparing prices of different products at different markets in the vicinity before selling, which enables them to obtain good prices and eliminate the local middlemen who in most cases underpay the producers to boost their own profits. Better knowledge of prices also raises the quality of products in response to market demand.

Mobile phones enable the owners of the SMEs covered by the survey to avoid spending time and money on a long bus journey to obtain information on inexpensive products. Sales can be guaranteed by obtaining information in advance on the availability of customers. Most of those interviewed indicate that they have managed to cut the costs of different production operations. The study shows that use of mobile phones in small-scale craft businesses can help to obtain better prices, through improved coordination of product transport from the supplier and by helping to find new market locations. For example, the wood engravers have used their mobile phones to find markets in the capital Dar es Salaam and have been able to send their produce to Bagamoyo in time to coincide with the arrival of groups of tourists. One of the people interviewed noted that even geographical barriers were falling, as the use of mobile phones now enabled him to sell his products in remote areas.

The study has also shown that the mobile is used for a range of social interactions, the same telephone being used both for business and for personal reasons.

The cost of calls is the only factor that limits the use of telephones in SMEs to extend the market for products, and this is especially the case with SMEs that are most lacking in capital resources. According to one interviewee, it is expensive to call a client if a deal is not concluded, so "you are forced to use SMS". In this particular milieu in Tanzania, using SMS appears to be a stopgap solution rather than a habit. The preference for a particular function depends on a number of factors, including the price of calls and messages, users' income, their level of literacy and skill, whether an intermediary is available to help, and so on.

Streamlining the fishing industry

To summarize, mobile telephony is regarded as a catalyst for productivity and for disseminating and obtaining information in SMEs, minimizing the need for travel and face to face meetings to clinch deals. Mobile phones give small enterprises the capacity to contact new clients and suppliers rapidly. Mobile telecommunications thus promote greater fairness by enabling disadvantaged populations to have access to information which would be difficult or impossible to obtain by using only fixed telephone lines, which in most areas will not be up and running in the near future (Melchioly and Sæbo 2010).

1.4.4 The media: At the forefront of appropriating mobile telephony

The crucial importance of mobile telephony for journalists has been shown in a number of countries in connection with coverage of elections. During the presidential elections in Senegal in 2000, private radio stations were able to cover all the voting stations in the country thanks to journalists' and correspondents' portable phones and to report early trends from the evening of the elections onwards. The fact that editorial offices were able to synchronize with reporters using mobile phones guaranteed a certain transparency in the ballot and helped to prevent or at least minimize election fraud. For the journalists, the portable phone became an indispensible tool and one well suited to the requirements of the profession. The portable has become a means of ensuring effective coordination between reporters and their central offices, in particular in live coverage of events. Where it was once necessary to send in a crew and cumbersome equipment, reporters can now use their portable phones to cover events as they happen. This tool can help to bring about a revolution in the media and is already revolutionizing democracy in some counties (Ndiaye 2008 – Cipaco 2005).

SMS messaging is also widely used by journalists, something which has been studied by Norbert Ouendji, a Cameroonian journalist. He notes that journalists use SMS to send information back to their editors fast[17]. The same applies to their radio and TV colleagues

[17] Maurizio Ferraris compares the portable phone to a typewriter. See *T'es où ? Ontologie du téléphone mobile*, translated from the Italian by Pierre-Emmanuel Dauzat, Albin Michel, Paris, 2006, p. 83.

who are encouraging their audiences to use text messages to participate in some interactive broadcasts or in games. One prominent example is "Zap presse", a discussion forum run by Radio Tiémeni Siantou in Cameroon[18]. This is a forum which, every Sunday between 10 and 12, brings together journalists and a range of individuals to talk about one or more topical themes. A portable telephone number is announced by the presenter in order to encourage listeners interested in the debate to make their own contributions.

Journalists have become well-acquainted with the enigmatic language used in the world of the SMS, which has become a genuine social phenomenon. A process now underway is opening up the possibility of diversions, bypassing, reinvention or of direct participation of users in the design of innovations (Breton and Proulx 2002).

[18] Radio Tiémeni Siantou, a private FM broadcaster in Yaoundé.

And this is all the more the case since SMS were originally intended as a means by which operators could inform users of the state of the network[19] (Ouendji 2010).

On the other hand, use of the mobile phone for accessing the Internet is still not widespread in Africa [20] even among journalists, and there is still much to be done in this area to adapt the tool and procedures to users' needs.

[19] The history of the SMS suggests that the first SMS text message from one mobile phone to another was sent in 1993 by Riku Pihkonen, an intern with the Finnish telecommunications company Nokia. As regards the first commercial message, it is said to have been sent in 1992 by Neil Papworth, an employee of the Sema Group. The SMS in question was sent from his personal computer to a mobile telephone on Vodafone's GSM network in the United Kingdom (Ouendji 2010).

[20] Except perhaps in South Africa and the Maghreb countries, although there appear to be no studies on this subject.

2 Designing the right products and services

The advent of mobile telephony has meant that for the first time in history the majority of the world's population has at its disposal an interactive communications tool and can access its services, and this should have significant effects on economic growth. "In several countries, mobile penetration is beginning to transcend the 40 per cent critical mass identified as necessary to enjoy the network effects that realize economic growth and development-producing innovations such as mobile banking and employment or agricultural information services" (Gildwal 2009).

Until now, the device available to most people with low incomes has been a simple telephone programmed for voice and SMS and with only limited Internet capability, and even though smart phones are increasingly on sale, they are used in a way well below their potential capacity.

A cursory review of projects that have been set up so far suggests that most are based on the use of SMS as a means of disseminating information on health issues, agriculture and e-banking. However, there is considerable potential for greater use of web–based mobile applications and this is now starting to be explored in Africa, given the explosive growth since 2008 in the number of people using their mobile connection to access the Internet.

It is in the developing countries that the most interesting innovations might occur. Could the portable phone become the computer for everyone in the near future? It might become communications tool, Internet portal, school textbook, family photo album, debit and credit card, radio, and a number of other things, if someone can adapt it in the right way. (Selanikio[21] 2008).

There are numerous development projects and applications now underway, and we give here only a brief outline of the principal areas concerned. We then give some indications as to the likely prospects for development of certain areas such as web mobile, with its potential benefits and problems.

An overview of some current projects and applications

2.1 Financial services achieving real success

According to one survey by Research ICT Africa in 2007−08, almost 30 per cent of people interviewed in 17 countries in sub-Saharan Africa borrow money from their families and friends (ria.net).

From Kenya to South Africa, from Uganda to West Africa, operators and banks have seen the incentive to offer financial services to largely "unbanked" clients. While payment by portable phone is making little headway in Europe, Africa has taken a lead with this real innovation in financial services via the mobile phone.

[21] Joel Selanikio is a physician and co-founder of DataDyne.org, a startup company that creates open-source software for public health and international development.

M-Pesa, the first fund transfer service using mobile phones in Africa, was launched in 2007 in Kenya by Safaricom and had reached 6.5 million customers by May 2009, or 13 per cent of the population within a period of less than two years (Wikipedia, M-Pesa). Money can be transferred by SMS from any portable phone fitted with a compatible SIM card. The sender registers free of charge with an official agent on presentation of an identity card. He or she then buys call time which is transferred to the portable phone account of the beneficiary, who can then go to another agent to cash in the credit. Most transactions do not exceed 2'000 Kenyan shillings (USD 25.80). The M-Pesa system has been a success because it is based on traditional payment practices, extensive mobile phone networks, and a large network of distributors who work with established agents, each of whom is given basic training. Three months after the launch, the service had 400 agents – compared to the 450 bank branches and 600 cash dispensing machines in Kenya. In 2009, the number of M-Pesa agents passed the 3'400 mark. The system is simple and fast, a transfer taking no more than 30 seconds[22].

The success of M-Pesa is due to its ability to adapt to local conditions and requirements.

The M-Pesa model has been imitated in Africa, according to African Economic Outlook [23], but the technologies and commercial systems used vary widely. "The standard mobile phones widely available in Africa today allow the use of SMS, Interactive Voice Response (IVR), Unstructured Supplementary Services Data (USSD), and new generation SIM cards that can be personalized by the operator. In South Africa, Wizzit, the First National Bank (FNB) and Amalgamated Banks of South Africa (ABSA) use SMS, IVR and USSD technology. These are independent open systems run by the mobile network operator. M-Pesa in Kenya and MTN Banking in South Africa make use of personalized SIM cards. Their fund transfer systems are accessible only to members.

Also in South Africa, NedBank, the FNB and the ABSA use more sophisticated technologies including the Wireless Application Protocol (WAP) and secure web servers (https). These systems are accessible only to people with compatible phones. The Near Sound Data Transfers (NSDT) system developed by Tagattitude, which uses a phone's audio channel to transmit an encrypted code for making payments, has the advantage of being compatible with all mobiles on the market. It is being tested in South Africa, the Democratic Republic of Congo, and Zambia. It will shortly be launched in Ghana, Mali and Nigeria.

[22] See http://www.safaricom.co.ke/index.php?id=745.

[23] AfricanEconomicOutlook.org, developed from the online annual *African Economic Outlook* report. Like the report, AfricanEconomicOutlook.org draws together the expertise of the African Development Bank, the OECD Centre for Development and the UN Economic Commission for Africa, as well as that of a network of African think tanks and research centres. Its broad coverage of the continent and rigorous analytical methods make it an essential tool for anyone wishing to understand economic, social and political developments in African countries.
See http://www.africaneconomicoutlook.org/en/.

African commercial models are opening up new ways for payments and banking. Where services have the support of the banks, they adhere to the banking regulations in force. In South Africa, Wizzit is managed by the Bank of Athens and can be used by any mobile telephone operator. This is the case also with the joint enterprise MTN Banking in South Africa, which grew out of an agreement between the operator MTN and Standard Bank", and the partnership agreement signed in January 2010 in Morocco between Maroc Telecom and the country's two leading banks.

Transaction costs are between 1 and 3 per cent of the sum being transferred, as opposed to double-digit rates for traditional procedures. M-banking should increase the number of people with bank accounts in Morocco. Since 6 January 2010, it has made it possible to effect financial transactions in Morocco using a mobile phone. Given the name "Mobi Cash", this first money transfer and payment service using mobile phones is governed by a tripartite agreement signed by Abdeslam Ahizoune, Chairman of the Maroc Telecom Board of Directors, Mohamed El Kettani, President of the Attijariwafa Bank group, and Mohamed Benchaaboun, President of the Banque Populaire group. The agreement sets out the conditions for having bank accounts, electronic money guarantees, Mobi Cash infrastructures and platforms, as well as marketing and customer relations. Mobi Cash enables customers of the principal telephone operator in Morocco to use their mobile phones to make deposits to their Mobi Cash accounts at all Maroc Telecom offices and approved distributors and to withdraw cash and transfer money anywhere in Morocco. Money transfers abroad should follow in the near future, according to those behind the project. Apart from technical aspects, the project reflects the overall convergence in the vision of the three partners, which emphasizes the need to reduce financial transaction costs. (6 January 2010, – "Maroc Telecom launches Mobi Cash", published 7 January 2010 in High-Tech).

AfricanEconomicOutlook.org adds that: "**There is a regulatory gap with banking services provided by mobile phone operators**. While mobile phone operators are accountable to telecommunications authorities, the scope of intervention of financial regulation is often undefined. Central banks responsible for monetary and fiscal policy in Africa have not started looking at e-payments, e-banking and other services. There is presently no mention of electronic transactions and e-currency in regulatory frameworks. M-Pesa in Kenya belongs to the telecommunications operator Safaricom and is not supported by any bank. M-Pesa was only able to start after lengthy discussions with local authorities. M-Pesa argued that it was transferring money, not taking deposits and so remains out of the scope of financial regulation.

However, the difference between a payment and a deposit is merely defined by the time the money remains in the system. Frontiers between telecommunications and financial services are easily blurred. And as African banks rely heavily on revenues from transaction fees, M-Pesa represents a strong competitor and has made a strong impact in its two years of operation. However, when the company announced in December 2008 that it would expand into initiating and receiving international remittances from the UK through an arrangement with Western Union, Kenya's Ministry of Finance announced plans to audit M-Pesa arguing there was a risk to customers. It appears that much of the pressure for the audit originated from the 48 commercial banks in Kenya. Last year Kenya received approximately USD 1.6 billion in international remittances which is around 5 per cent of GDP. At an estimated amount of USD 283 billion in 2008 according to the World Bank, global remittances attract much interest. Inward remittances are larger than ODA flows

(excluding debt) in countries such as Botswana, Ghana and Kenya, six times larger in Nigeria and three times in South Africa in 2007. Orange, Zain and MTN are already exploring the possibility of launching this service.

Mobile-payments and banking are quick and easy to use. This could enable rapid take up by unbanked population. According to the 2007/2008 Research ICT Africa survey the main reason people do not have a bank account is because they do not have enough regular income. Zero transaction costs were highlighted by many respondents as a reason for sending air-time instead of cash. M-Pesa for example, is particularly attractive for small transactions. In order to send KSH 1 000, Western Union would charge a fee of KSH 500 while M-Pesa would ask KSH 30 if the money is sent to M-Pesa users and KSH 75 if it is sent to non users. The technology could eventually be used to collect the transaction history of customers, enabling them to obtain a favourable credit rating.

Recent entrants planning to expand or begin providing similar services are CelPay in Democratic Republic of Congo and Zambia, Orascom in Algeria, Tunisia, Egypt and Zimbabwe, Monitise in Uganda, Burundi, Democratic Republic of Congo, Ethiopia, Kenya, Rwanda, Tanzania and Zambia, Globacom in Nigeria, Zain in Kenya, Tanzania and Uganda, Orange in Mali, Côte d'Ivoire, Kenya and Egypt and the Cooperative Bank of Kenya in Kenya. With only 19.8 per cent of individuals keeping their money in a bank account in a sample of 17 African countries, and more than 30 per cent worried about being robbed or losing the cash, the potential for developing mobile-banking seems high[24]."

[24] http://www.africaneconomicoutlook.org/fr/in-depth/innovation-and-ict-in-africa/pro-development-innovative-applications/ (consulted 19 April 2010).

Solar power phone box in Burkina Faso

2.2 Online system of information for agriculture struggling to become established

Inexpensive information systems for agriculture and fishing based on the use of mobile telephones started to make their appearance in Africa some ten years ago.

In West Africa, the first of these initiatives was Xam Marsé ("Know your Market" in Wolof), which was launched in Senegal by the Manobi Development Foundation after two years of research. Since 2002, it has been supplying farmers with information on market prices in return for a low-cost subscription. It uses all the modes of communication available on a mobile telephone – SMS, multimedia messages (MMS) incorporating images, video clips and sound, and the Wireless Application Protocol (WAP) which allows Internet access from a mobile phone.

"In Niayes, a farmer checks market prices in real time on his/her mobile phone to negotiate with the wholesaler and obtain the best prices. In Tambacounda, Senegal, groups of Sterculia gum growers use their mobile phone to inform their contract buyers about their inventory. In Sikasso, Mali, mango growers record information on every step of the process to trace their products for export markets in compliance with Global Gap requirements. These examples show how Manobi uses mobile phone technology to help small scale farmers play a more active role in the product value chain. An innovative business model developed by Manobi supports the delivery of the services while creating a sustainable ecosystem for the farmers and all the value chain operators." (Daniel Annerose, President of Manobi, manobi.org).

"Esoko Networks (known previously as TradeNet) was started in 2004 by the Ghanaian software company BusyLab. Esoko has a website where more than 800'000 prices from hundreds of markets are quoted, with a focus on Sub-Saharan Africa. Because only a small percentage of users are active on the Internet, Esoko has relied on an SMS platform. Users can sign up to receive weekly SMS alerts on commodities for a fee and the cost of the SMS. Users can also upload offers to buy and sell products via mobile phone and make precise price requests on commodities in a country receiving the information by SMS.

There are two major initiatives in East Africa. In Kenya, SMS Sokini provides agricultural information through SMS text messages for a fee. The project is run by a partnership between the Kenyan Agricultural Commodities Exchange (KACE) and mobile operator Safaricom. Information kiosks are located near where agricultural commodity buyers and sellers meet, providing low cost access to farmers. KACE workers collect the information from the kiosks and send it to farmers, buyers and exporters on text messages. In 2005, in Uganda, the Women of Uganda Network (WOUGNET) started to send SMS texts with market prices to 400 rural farmers with financial support from the Technical Centre for Agricultural and Rural Cooperation ACP-EU (CTA). Workers collect information from markets and data is posted on the Busoga Rural Open Source Development Initiative (BROSDI) website. Other workers translate the information to Luo, a local language, and send it to farmers by SMS. Farmers can request more information by replying to the SMS. WOUGNET is providing free mobile phones and free access to this service.

The SMS messages enable farmers to access accurate information at an affordable price, typically 1/7th of the cost

of a call and up to an estimated 1/10th of the travel cost in some cases. The information has increased the bargaining power of farmers, who in the past had little alternative but to sell their goods to the wholesalers located nearest to them.

There are several obstacles to the wider use of e-agriculture technology however. Even though 39.1 per cent of the African population owned a mobile phone in 2008, many unprofitable rural areas are not covered by mobile services. E-agriculture cannot anyway answer all of farmers' problems such as poor transport. The information systems are difficult to sustain. In Ghana, TradeNet has had to hire and train agents to collect information, which anyway can be easily pirated. Manobi subsidizes the collection of market data. Esoko has been subsidizing SMS alerts for individuals, but most people prepay for their text messages, so it is now only subsidizing SMS alerts for individuals in Ghana. The challenge is to provide information that farmers feel is worth paying for. Farmers and traders are not using radio-based MIS in Sub-Saharan Africa because the information does not meet their needs so the providers will have to tailor their services more to the needs of users"[25].

There is also without any doubt a need for better training for farmers and to integrate them more effectively in the data reception system in order to spread the use of SMS and Internet. In Cambodia, a Canadian project Camip (Canada Agricultural Market Information Project) is developing an SMS system that enables farmers to know prices for their produce but unlike the African systems, they receive training from farmer marketing schools in using the system and in way of optimizing their activity by improving packaging, bargaining skills, post-harvest processing and networking between peers (AfricanEconomicOutlook.org, Donner 2010).

[25] AfricanEconomicOutlook, op cit.

2.3 Humanitarian work and health care

A key element in development is the improvement of access for populations to relevant information on health issues and living conditions.

Support structures are benefiting from new ways of communicating with all the partners involved. News modes of communication, networking and exchanging information provided by the mobile phone – such as SMS updates on action campaigns and activities – are enabling communities to receive information but also to provide information, by allowing it to be collected in a variety of ways including text messages, images, photos or even video clips.

In the field of health care, one study conducted by Vital Wave Consulting for Vodafone (Vital Wave consulting 2009) takes stock of different projects in this area of health-related uses of mobile telephony ("m-health").

This area is in the early stages of development, and most of the projects are pilot projects. However, given the rapid pace of adoption of wireless technologies and their ever-increasing geographical spread, m-health has great potential for development and could lead to a considerable improvement in public health. Such improvements might be achieved at two levels: greater efficiency in prescribing health care measures and in the actual services provided.

For example, a system of data collection using mobile phones[26] is being used to collect information on mothers' nursing habits and child development measurement in rural areas of eastern Uganda and has produced better results than a similar paper information gathering exercise. Data input errors have been considerably reduced, cost-effectiveness improved, and the users have willingly accepted the new technology.

Another example of m-health is the practice of using SMS alerts to remind patients to take their medication. Health care personnel have noted that 40 per cent of hospital readmissions for heart attacks are due to the failure of patients to take their medication correctly. Reducing hospital admissions can generate income for health care services. Such cases show how improved results in treatment and greater efficiency actually go hand in hand.

Access to wireless technology is also stimulating areas such as the treatment and prevention of HIV/AIDS, improved maternity care, follow-up on outbreaks of transmissible diseases, and efforts to ensure that children get preventive care and vaccinations. That technology in turn is enabling remote connectivity with health care systems and experts. The key applications are in the following areas:

- education and awareness raising;
- access to health data and files;
- monitoring and conformity of medication;
- emergency response;
- health administration systems;
- analyses, diagnostics and consultations.

The survey report cites examples of applications for each of these areas, and suggests that current efforts need to be improved, made sustainable, and their impacts on health measured. The four key elements for the success of m-Health programmes are as follows:

- Matching m-health applications to health needs. The technological solution has to be designed through a user-centred approach, and must keep in mind health care objectives and the nature of the user's environment. When designing new solutions, technical experts should consult the end user and discuss the ways in which they are likely to use the mobile in their everyday work;
- Using a simple, tried and tested technology;
- Creating more points of intersection between cyberhealth and m-health;
- Providing guidance and tools to maximize the impact of action taken and ensure proper evaluation of results (Vital Wave consulting 2009)[27].

[26] EpiHandy, developed by Bergen University's International Health Centre.

[27] United Nations Foundation and Vodafone Foundation Technology Partnership is a leading public-private alliance using strategic technology programmes to strengthen the UN's humanitarian efforts worldwide. The Partnership has three core commitments: (1) to support the use of rapid response mobile telecommunications to aid disaster relief; (2) to develop health data systems that improve access to health data thereby helping to combat disease; and (3) to promote research and innovative initiatives using technology as an agent and tool for international development. Further information can be found at: www.unfoundation.org/vodafone.

Provision of information on health issues via mobile phones ranges from a question and answer service on water and water purification, set up by Netwas in Uganda, to a breast cancer information service run by Mobile4Good in Kenya, Tanzania and Cameroon, or awareness-raising activities like "la liberté du sida", a game aimed at reinforcing the message about protected sex. In Zimbabwe, an interactive voice answering system has been set up by Kubatana, a civil society organization that aims to provide teenagers with information on sexual matters from a web site entitled "Auntie Stella".

There are also numerous examples of applications and systems that have been developed to improve the efficiency and competence of public health authorities, including small-scale monitoring projects, data collection programmes or multifunctional systems.

A range of systems have been put in place enabling practitioners to obtain information of relevance to them on demand or by automatic downloading. For example, doctors in Uganda can obtain medical texts via their personal digital assistants (PDA) by downloading a weekly bulletin with the Satellife or Maliwi programmes, and health workers can obtain information on the effect of drugs via an SMS platform called Frontline. In Nairobi, students have developed a blood bank using SMS and a system that enables the district hospital to monitor and coordinate blood donations. Other applications are used to collect data on the effectiveness of insecticide-treated mosquito nets in Uganda with Netmark, or to assist rural midwives in northern Uganda, using an information and reference system via Rescuer. EpiSurveyor is the first "web 2.0" application for international development and health. It is based on a free mobile web platform that can be installed and started up within an hour. No meeting or payment is required; all that is needed is to connect and start receiving data (Selanikio 2010)[28].

One well-known example is the Pésinet programme in Mali, which uses mobile technologies to record weights, prevent illness and reduce mortality among small children in low-income families.

A review of the abundant literature on the issue of development projects based on mobile telephony suggests that until now, with rare exceptions, services that aim to improve conditions of life in Africa have yet to achieve their full potential. Many are pilot programmes or "niche" services, which have nevertheless been reviewed and form a body of case studies which can serve as a basis for future development[29].

[28] See EpiSurveyor.org and “10 Things You Might Want to Know Before Building for Mobile”.

[29] See: annex 2 of H. Beardon: *How mobile technologies can enhance Plan and partners work in Africa, Guide prepared for Plan*, January 2009 Plan Finland Pasilanraitio 5, 2nd floor, 00240 Helsinki, which presents a selection of projects and contracts, http://mobileactive.org/files/file_uploads/Mobiles_for_Development_-_Plan_2009.pdf) – “Mobiles in-a-box“, case study, (http://fr.mobiles.tacticaltech.org/en/taxonomy/term/4) , and especially the very important digest of the W3C group: – “Stories From Mobile Web For Social Development“ (MW4D) (http://www.w3.org/2008/MW4D/wiki/Stories).

Monitoring child health – Pésinet in Mali

The Pésinet project in Mali deploys mobile technology to prevent infant sickness and mortality among low-income families. Although basic, this system has been able to deliver real improvements in infant mortality indicators. Infant mortality indicators during a previous pilot project in Senegal fell from 123 per 1 000 to 5.3 per 1 000. See www.alcatel-lucent.com .

Members of the community are trained to be 'Agents de Pesée' (ADPs) to implement the project at community level and are provided with Java-enabled mobile phones. Every month, ADPs, working with local midwives, identify and register low-income families with children under five, and pass their names to the project coordinator (1). Each child is weighed and monitored at home once a week, babies under one year twice a week, and these data, along with other relevant symptoms such as vomiting or diarrhoea, are transferred by the phone via GPRS to the project database . The database then alerts the project paediatrician to children who show significant weight loss or other risk factors . The doctor can examine the risk curves and send text messages to the ADP with the names of those children who need to be examined in person . The ADP can then inform the family and advise them to bring the child to the Pésinet centre for examination .

Source : Mobiles for development – How mobile technologies can enhance Plan and partners work in Africa Guide prepared for Plan by Hannah Beardon, January 2009

3 Summary of results and future prospects

The near-universal use of mobile telephony in Africa, its accessibility, ease of use and above all the fact that it has been appropriated by the local populations, presents a challenge to the traditional ways of analysing the use of ICTs for development.

Very low-income populations make the purchase of a mobile phone a priority, in the belief that it has potential benefits for them. Such populations, which are the intended beneficiaries of development projects, invest of themselves not only in order to acquire a phone but also by innovating and creating new functions and applications of use to them. There is thus a "bottom up" development of different uses that is quite different from the classic "top down" flow of information like that of radio or television, and more like that of the Internet, which develops along more organic lines like a sponge (Combes 2005).

Given this enthusiasm for the mobile, many of the players, both public and private, as well as NGOs, have mobilized to provide services for this low-income majority. At the forefront are the operators and manufacturers, who have understood how to change the economic model, adapt their phones and applications and open up access to voice and messaging services for more people at affordable prices. The State is another major player. Most African States have developed regulation policies that have supported or stimulated this trend towards universal access to ICTs, especially the telephone [30] (Chéneau-Loquay 2009-2, Dahmani A. et al. 2007).

Consequently, it may be said that a process of democratization of the telephone is under way, although profound inequalities persist among African countries (a penetration rate ranging from 96 telephones per 100 inhabitants in Gabon to only 3.7 in Ethiopia (ITU-D 2009)), between towns and rural areas, and among different social groups. For those who own mobile phones, however, they have become indispensible. They say something about an individual's identity, can be used as a means of cementing social and family relationships and as a working tool, and have become a part of local cultures.

But how will the use of mobile telephony evolve in the coming years? Will broadband mobile access and Internet develop in the same way as has been the case with basic telephone use?

In an attempt to clarify this question, we will now consider the lessons that might be drawn from current practices and emerging trends in technology and in society.

[30] As regards the available supply of telecommunications equipment, universal access and service are fundamental principles enshrined in public policy texts in Africa and elsewhere. Universal service must focus at the outset on the fixed telephone service and "must evolve in line with technical progress, market development and changes in user requirements", Council Resolution of 7 February 1994 on universal service principles in the telecommunications sector. The two areas priority areas are Internet access and mobile phone communications (Chéneau-Loquay 2009-2).

3.1 Advantages and drawbacks of information systems based on short message services (SMS)

In terms of technology, the above overview shows that in Africa, mobile applications for development focus generally on the provision of SMS services.

From the user's point of view, this predominance reflects the most widespread level of capacity of phones available to users. All SMS services are accessible from any basic phone and available to users who have only prepayment systems.

From the point of view of senders of information, SMS is the technology most easily accessible for any individual or company wishing to obtain information via mobile phones. Setting up an SMS platform is quick, inexpensive and relatively easy. This makes it an ideal tool for organizations with limited resources, small budgets and only rudimentary IT expertise. There are a number of free and inexpensive platforms such as FrontlineSMS[31] and Episurveyor[32].

Nevertheless a number of economic and cultural constraints arise from that very availability and ease of use.

The 160 SMS characters are limited when it comes to more complex and sophisticated uses. Text is a hindrance for illiterate users, who may be unable to make full use of the system. Solutions involving the use of voice messages to deliver information can be used by those unable to read or write but are relatively costly and still at an early stage of development.

In terms of fixed costs, phones offering only voice calls and SMS are cheaper than those that allow data transfer but the variable costs are higher: to send a simple voice message the cost will be around USD 0.20 a minute or half that for an SMS. The same message sent via a GPRS link, from a WAP page or using a dedicated application would cost 1 cent or less (Donner 2009). Text messages thus remain a rather expensive and limited tool for transmitting information. To reduce transmission costs, the "developers" use multi-session SMS systems to send a wide range of complex data. One advantage of SMS platforms is that messages are sent using an SIM card and a local mobile phone. There are also Internet-based services for sending grouped messages such as Clickatel[33] and BulkSMS[34], but they are unsuitable for organizations working in regions with unreliable telecommunications infrastructure or without an Internet connection. Services of this type also require a credit card[35].

3.2 Towards the mobile web for all?

All the actors in the sector are in agreement that the next stage in the expansion of mobile telephony on the African continent will be the Internet market, but they do not all agree on the way this will come about.

31 http://www.frontlinesms.com/.

32 http://www.datadyne.org/episurveyor.

33 http://fr.mobiles.tacticaltech.org/Clickatell.

34 http://fr.mobiles.tacticaltech.org/BulkSMS.

35 http://fr.mobiles.tacticaltech.org/.

Mobile telephone operators need to construct the broadband networks and associated protocols that will allow the web's potential to be fully exploited. According to *Guy Zibi, Director of AfricaNext,* a company that specializes in telecommunications market analysis in Africa, the mobile telephony industry will now be trying to do for the Internet market what it has already done for voice telephony:

"The obstacles are numerous; limited infrastructure in key portions of the Internet network value chain; high cost of bandwidth and customer equipment, low literacy levels and small addressable markets. And yet the opportunity carries this perennially unique African blend of highly promising potential and often uncertain returns, setting the stage for the next phase of mobile market expansion on the continent."
(Zibi 2009)

For the W3C collaborative consortium of developers working to develop the web, and working with mobile phone industry leaders to improve access and content production for mobile users, there is no problem of access or interoperability if the operator provides a data service with full web access[36].

[36] W3C has created the "Mobile Web Initiative" the aim of which is "*to make browsing the Web from mobile devices a reality*", according to Tim Berners-Lee, Director of W3C and inventor of the Web.

A phone repairer

Participants attending a symposium on the potential of mobile telephony, held in Maputo in April 2009[37], expressed the view that navigating the web has now become a viable option for providing richer content and developing more complex applications. Mobile phone web technologies offer a major opportunity for developing a large number of applications on a large scale and at low cost, by authorizing the establishment of new services in Africa. A stable and effective GPRS already provides a means of providing content for the public. Richer applications using images and graphics such as icons also offer services of increased added value, and easier access for low-income population groups. The same participants, however, regretted the lack of collaboration, cooperation, and sharing among those working in this area (NGOs, grass-roots organizations, various institutions, and so on), all of which creates the impression of a large number of systems and platforms competing to solve the same problems. One reason for this is the lack of visibility and knowledge of what is being done by others.

They also considered that challenges associated with upscaling and the replicability and sustainability of projects already under way or planned are crucial, and called for the participation of all the players (governments, enterprises, NGOs and local communities). That in their view is the only way of providing services and information for the remaining 1 billion potential users (Boyera 2009).

The development landscape of these technologies and their uses will thus continue to evolve rapidly, and in four or five years there is likely to be a range of different options, from SMS to WAP and including GPRS applications, up to full Internet, in a way that is convergent with experimental approaches using smart phones and "netbooks". As costs will fall, phones will increasingly be able to receive data. Creators of development services or applications will need to make calculations based on their specific data transmission requirements, the demographics of their users and the pricing systems of the telecommunications companies in their target countries, in order to know whether they have reached the point at which the transition to GPRS and the next generations can begin.

3.3 What kind of social change?

The technologies will be further developed, but how will they become an integral part of the everyday lives of populations and what will their impact be? There are still uncertainties here. The available literature on the use and impact of mobile telephony for "development" purposes does not suggest any overriding and consistent trend as regards social and economic change.

Donner, however, identifies a new convergence among different technical and organizational models (Donner 2008), which reflects the priorities of funding bodies, local NGOs and government representatives, and suggests some market opportunities. It should be recalled that in almost all the cases studied, the service provided does not involve only the user's mobile phone; beyond what is actually visible on the user's small screen there is a computer, a server, and an entire organizational "ecosystem". In agriculture, small and medium-sized enterprises and medicine, information systems are generally set up and maintained at key points of influence by large institutions such as Kenya's National Farmers Information Service (NAFIS), the Kenyan Agricultural Commodities Exchange Program (KACE), and, in

[37] "Workshop Executive Summary", April 1-2 2009, Maputo, Mozambique, Stéphane Boyera, George Sadowsky, Workshop Chairs, W3C, Mobile Web Initiative.

Kenya, Ethiopia and Tanzania, the Livestock Information Network Knowledge System (LINKS), which provides information on prices and volumes of livestock for sale in different markets, as well as meteorological data. Such centralized systems are used to disseminate information on prices in a number of markets for a variety of products and producers and allow sharing of costs and time spent on searching for information, which would otherwise have to be borne by individual farmers. In Donner's view, this increasing institutional involvement could be one of the most important impacts of these new information systems. The institutions concerned are thereby brought into close contact with the smallest enterprises, which are often at the margins of the formal economy. If they can help more farmers and small entrepreneurs to become more productive by reducing information costs, inculcating new skills, or advising consumers, this will be beneficial for families whose livelihoods depend on enterprise.

This does not, however, imply the birth of a new paradigm of economic organization. Existing literature suggests that mobile phone use makes enterprises more productive and markets bigger and more efficient, not that the market structures are fundamentally transformed.

Still focusing on economic aspects, a very recent study funded by the World Bank and based on data from 120 countries has shown that all information and communication technologies (ICT) stimulate growth in developing countries more than in the developed countries. This is due to the role of ICTs in making markets more efficient, reducing transaction costs, and improving productivity through better management – in both the public and private sectors. These problems are more acute in the developing economies, which would explain the greater impact there of improved access to telecommunications (Qiang 2009).

Despite these advantages, there are, nevertheless, limits to what mobile technology can do.

There is a "mobile gap" due to problems of access to electricity supply, network coverage, income inequalities, and differences in the functional features of models designed for an affluent minority. So although mobiles are an excellent tool for stimulating the development of communities, they also reflect inequalities of opportunity.

An analysis of current projects shows that technology on its own cannot solve social problems. It is applied in order to improve relations and development processes, and in doing so it creates competitive advantages that may marginalize those who have no access to it. In the end, the mobile technologies that are adopted will have to be determined by the overall direction and quality of the underlying development process. Isolation and marginalization of populations are social problems which technology alone cannot solve. Mobile phones are just tools and can only be a helpful aid in social organization, not a central pillar of it.

As regards sustainable development and extension of the technology, most innovations and applications in mobile telephony, as in any other areas[38], have to reach a certain "critical mass" of users before having a real impact and becoming *sustainable*. This requires time and a change in scale. The basic ingredients for sustainability are: a sufficient number of people being informed of the application in question, able to access it, and finding it

[38] With regard to public Internet access projects, see Chéneau-Loquay 2009, the ADEN Internet access project financed by France.

sufficiently useful to tell others about it. If users find a service useful, and there are enough of them to make it function, the service will be sustainable.

Establishing links with the objectives and programmes of local and national governments will enhance the durability and scope of these new services. Political will is a key factor in project success. Local organizations and actors are also key partners when it comes to ensuring that a given technology has local support. The mobile phone market, which includes network and phone providers, is one partner but not all information and communication services can be commercialized, and the role of NGOs in ensuring that the market does not overlook the needs of the poorest and most marginalized population groups is very important.

The impact of mobile technology and its uses must be evaluated from the dual perspective of the social goals that are being sought and the effectiveness of the technology itself.

Conclusion

It took 15 years for one quarter of humanity to have a mobile telephone (achieved in 2003), and only seven years for 3.8 billion people, half the world's population, to have one[39]. How long will it be before most of humanity surfs the Internet to find solutions to everyday problems? Almost all future new entrants to the market live in developing countries. The future, in terms of uses, innovations, technologies and markets for mobile telephony, is taking shape in the poor countries. Some 7 million Nigerians surf the Web using their portable phones. High-speed mobile telephony has been described by the ITU as the solution to the problem of inadequate infrastructure[40] but will these services become widespread if they require new investment? On the other hand, the assumption that smart phones and services will be within reach of most individual users in Africa is debatable. It is true that the explosion in mobile telephony has surprised everyone, not least the operators, who did not expect it because of the widespread poverty. But can this be repeated? If the prices of smart devices fall, they will sell easily because of their multi-functionality (music, radio, recording, personal agenda, even pocket lamp), but Internet use via mobile phones poses some more complex problems than voice or SMS: cost, obviously, but also questions relating to ergonomic aspects and general utility. Internet use is currently developing relatively slowly in Africa, and concerns mainly younger people who frequent Internet cafés essentially for amusement (Chéneau-Loquay 2009). The creation and maintenance of public Internet access points is still essential for other uses (office work, Internet search applications, emails with attachments, data downloading, and so on).

It is nevertheless certain that if the high cost barrier were removed, innovation would take off in Africa. In the view of Steve Song: "Low cost of access can turn a country into a super-power by enabling everyone to be an innovator. This explosion of innovation is non-linear. Increasingly, any country without very low cost access is like a child left on the platform as the train of the knowledge economy pulls out. Africa has a billion resilient, amazing, creative people in it. A very tiny percentage of them have the kind of wealth that would give them freedom to innovate without fear of failure. It's great that mobiles have created more efficiencies on the continent and some innovation. Driving down the cost of access will give African countries super innovation powers…" (Song 2009).

[39] The mobile industry now has 4.6 billion active subscriptions. But not all subscriptions are unique users. The total number of unique users is 3.4 billion people, i.e. exactly half of the planet. So for contrast - on the planet there are 1.2 billion PCs of any kinds including netbooks; 1.6 billion TV sets, 1.7 billion Internet users (including those who access at an internet cafe or via a mobile phone); and 3.9 billion FM radio receivers – but 4.6 billion mobile phone subscriptions. A mobile phone account for 68 per cent of the planet already! (5 February, 2010, The Big Picture "All the Stats" Total View to Mobile Industry, 2010 Edition, <http://communities-dominate.blogs.com/brands/2010/02/the-big-picture-stats-view-to-mobile-industry-2010-edition.html> The blog of the book Communities Dominate Brands Business and marketing challenges for the 21st century, by Tomi T Ahonen and Alan Moore.

[40] In the report *African telecommunication indicators 2004*, p 11: "Indeed, if many pundits are correct, and the cause of low Internet penetration in Africa (only 1.6 per cent at the end of 2003) is due to a lack of infrastructure, then high speed mobile could be a major improvement." It could be based on optical fibre technology which is also used in Africa, is a better system for high bandwidths and can be installed with other networks; with water, electricity and roads, there are no alternative solutions but they are nevertheless prerequisites of sustainable development.

Similarly, States and regulating authorities have grasped the crucial role which they must play to promote an environment conducive to investment with the aim of achieving universal access and developing innovations that will make it possible to attain a critical mass of users[41]. And there is no doubt that the advent of high interconnection capacities via undersea cables on the African continent [42] will radically change the situation and prompt operators there to seek new sources of revenue. The inventiveness typified by mobile voice telephony will make itself felt again.

[41] This was clearly expressed at the Global Symposium for Regulators in 2009 (GSR09), which defined guidelines on good practices with regard to innovative approaches to regulation in a world characterized by convergence with a view to strengthening the foundations of a global information society;
See: http://www.itu.int/ITU-D/treg/Events/Seminars/GSR/index.html.

[42] See the Many possibilities site, which provides regularly updated charts of undersea cables for connecting the African continent (http://manypossibilities.net/african-undersea-cables/).

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The democratization of mobile telephony in Africa, its availability, ease of use and, above all, the extent to which it has been appropriated by the public, have made it a major success story. Very low-income populations are not only actively demanding access to mobile telephone services but also innovating, by creating the functions and applications they can use. Development is thus happening "from the bottom up" and an entire economy, both formal and informal in nature, has come into being to meet people's needs.

Many different actors – private, public, NGOs – are now mobilized. Operators and manufacturers have successfully changed their economic model and adapted their products and applications to allow access to services at affordable prices. NGOs have in addition created a range of messaging-based services in different sectors.

However, the future evolution of mobile telephony is not clear. A range of different approaches will co-exist, from SMS up to full Internet capacity, including experimental initiatives using smart phones and "netbooks". Falling costs will lead to an increase in the number of phone devices with data receiving capacity. Individuals and companies involved in creating services or applications for development will need to take account of their users' demographics and incomes, as well as the pricing systems of telecommunication companies in countries where they wish to operate.

In this, States and regulating authorities have grasped the crucial role which they must play in promoting an investment-friendly environment with the goal of achieving universal access and stimulating innovation – key factors in achieving a "critical mass" of users.

The advent on the African continent of high-capacity links via submarine cables will change the ground rules and force operators to seek new sources of revenue. The inventiveness that has already been evident in mobile voice telephony will be needed once again if the "mobile divide" (in terms of costs, power supply, and so on) is not to widen.

This report takes stock of developments in this sector, which is crucial to Africa's economic development, and suggests a number of possible directions it might take.

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